

ARCHIVES OF OTOTOLOGY.

A CASE OF PAROTIDEAN AND INTRA-TYMPANIC MALIGNANT TUMOR.

By H. KNAPP.

With notes from Drs. H. B. SANDS and A. H. BUCK of New York, and Drs. S. H. PECK and S. J. PARKER of Ithaca, N. Y.

THE rarity and importance of tumors originating in the tympanic cavity or extending to it from adjacent structures may justify the following communication of a case which, though lacking the post mortem autopsy, seems to offer no small clinical and pathological interest. The patient was under the care of several physicians besides myself, viz., Drs. H. B. Sands and A. H. Buck of New York, and Drs. S. H. Peck and S. J. Parker of Ithaca, N. Y., to whom I am indebted for the privilege of embodying in this paper the substance of more or less extensive notes which they kindly placed at my disposal.

Mr. J. H. W., æt. 37, consulted me May 7, 1877, on account of sudden deafness in his right ear. Below and in front of his right ear there was a tumor the size of a hen's egg, which he had first noticed six or seven years previously. It had increased very slowly at first, but quite perceptibly during the last six months. His left ear was affected with chronic otorrhœa, without pain or any symptoms of irritation. His right ear never discharged, and he could always hear well with it until three days before he came to me. At that time he went to bed feeling and hearing as well as ever, but on awaking the next morning, he found that he was deaf.

Condition at first visit.—When the left ear was closed, he could understand ordinary speech at the distance of five feet, and hear the watch tick when in contact with the right ear, the right mastoid process or the forehead. There was no diminution of sensibility or mobility in the face or any part of the body, and his mental faculties were undisturbed.

The right membrana tympani was uniformly bluish-red, slightly convex and greatly dislocated forward. The cone of light was absent, but there was a dull roundish reflex on the posterior lower part. The malleus was seen in its ordinary direction from above-forward to below-downward, but its tip lay less deep in the canal than the short process. Neither the drumhead nor the adjacent parts of the ear-canal showed increased sensibility to the touch, and the drumhead yielded to the probe as if a soft substance, harder than liquid, were behind it.

The slow development of the pre-aural and infra-aural tumor, the pushing forward and appreciable resistance of the drumhead, together with the absence of inflammatory symptoms seemed to me evidence enough of the existence of a tumor within the tympanic cavity. The sudden occurrence of the deafness, I thought, was analagous to the sudden deafness caused by plugs of cerumen, which do not impair hearing, so long as there is the slightest chink between them and the wall of the meatus. As soon as this chink disappears, the deafness is manifest, and this is frequently observed to occur suddenly. In the same way, I imagined, the tumor in the drum cavity had grown imperceptibly, and only interfered with the hearing when it had occluded the whole cavity, or at least occupied the oval window and the niche of the round window. This event must of necessity have happened at some period in the progressive growth of the pseudo-plasm; but the sudden deafness might have been caused also by the occurrence of a serous or hemorrhagic effusion into the drum, an accessory symptom which is not infrequent in the progress of tumors occupying other parts of the body, for instance the skull or the eye.

When, the next day, I found the condition of the patient unchanged, I made an incision with a paracentesis needle into the

drum-membrane in front of and below the handle. The edges of the wound at once retracted, and through the gaping opening I saw a reddish, fleshy growth, filling the whole space behind the displaced membrana tympani. The cut-surface showed that the membrana tympani was not thickened. The incision caused no particular pain, liberated no pus, serum or blood, but gave rise to considerable hemorrhage, and did not improve the hearing. When touched with a probe the tumor gave the sensation as of a somewhat soft, fleshy mass.

Clinical diagnosis. The existence of a non-inflammatory, fleshy and vascular tumor in the tympanic cavity having been demonstrated, and for six years the development of another tumor in the parotid region having been observed, two questions presented themselves: Had these tumors any connection one with the other, and what was their nature?

As primary intra-tympanic tumors are exceedingly rare, and tumors in the parotid region are known to extend to the middle ear; furthermore, as the pre- and infra-auricular tumor had been steadily growing for at least six years, and evidences of any ear affection having been noticed only five days, I inferred that most probably I had to deal with a *primary parotidean growth, which had entered the tympanic cavity through the Glaserian fissure or its vicinity*. I further assumed that the two tumors were of the same nature, probably *adeno-chondro-sarcomatous*. This diagnosis was based upon the fact that the parotidean tumors are commonly of a complex nature: adenomatous, sarcomatous, cartilaginous, myxomatous and carcinomatous portions being frequently found together in the same specimen. The presence of myxoma appeared unlikely, as the parotidean tumor felt uniformly firm; and for carcinoma the patient was scarcely old enough.

Under this supposition I advised the patient to have the parotidean tumor removed by a skilled surgeon, and recommended Dr. H. B. Sands, whom I had seen successfully operate in similar cases. I imagined that if the supposed connection between the tumors were more than microscopical, both tumors

might be removed in the same sitting. He followed my advice, but delayed the operation. The incision which I had made in the drumhead was followed for a few days by a scanty sero-purulent discharge. On May 23d he came to me again, having had great pain in the ear the previous day and night. I found the inner half of the auditory meatus occupied by the tumor, and the walls of the outer half red, swollen and tender to the touch. I ordered warm instillations of a weak solution of carbonate of soda. During the next few days the inflammatory swelling in the outer part of the ear-canal and its surroundings was more pronounced. On May 29th the pain was relieved. An abscess had formed, and pus escaped upon pressure on the tragus. Both Dr. Sands and myself thought it advisable to delay the operation until the inflammatory symptoms had subsided. When in a few weeks this had occurred, on examination (June 20th) I found that the aural tumor filled the entire meatus, whereas there was no noticeable change in the parotidian tumor. My departure for Europe being at hand (June 23d) I advised him to let another aural surgeon in my stead take charge of his case, and proposed Dr. A. H. Buck, whom he also consulted at once.

As to the operation, Dr. Sands kindly gave me the following note :

"*June 26, 1877.* I excised the parotid tumor at the New York Hospital. A vertical incision, extending from the level of the meatus down to the lower end of the growth, measuring from three and a half to four inches in length, was made over the middle of the most prominent part of the tumor. It included only the superficial tissue. The remaining tissues were cut on a grooved director, and carefully dissected out with the fingers. The large mass was first removed, and beneath it was found a sort of a pedicle, which was also removed by careful and delicate dissection. The growth proved to be an enchondroma, covered by parotid glandular tissue externally, and firmly adherent to the digastric and other deep-seated muscles. The operation was difficult and tedious, but no large vessels or nerves were divided. After the operation no paralysis of the facial nerve could be detected, although the tumor was apparently situated beneath the parotid gland, the tissue of which was freely divided. No connection existed between the parotid and aural tumors ; and with Dr. Buck's assistance I removed as much as I could of the latter by means of a

dressing forceps, having previously snapped two pieces of wire in attempting to affect removal with the "snare."

July 24, 1877. Patient remained in the hospital until a fortnight since, when he went to Ithaca. To-day he returned nearly well.

Dr. Satterthwaite, who has examined the specimen, reports that the parotid tumor is cartilaginous, the aural tumor cancerous; but Dr. Buck thinks, from an examination he has made, that the latter is also enchondromatous. (See below.)"

For the following important informations I am indebted to Dr. A. H. Buck:

"The external tumor, removed by Dr. Sands, proved to be a mixed growth (fibrous, chiefly, but in part cartilaginous and in still others, cellular). The parotid gland was found spread out over the mass in the form of a capsule, but was not involved in its growth. Very careful search was made, but at no point could any offshoot be discovered which might be looked upon as the connecting link between the outer tumor and that within the ear. One portion of the growth seemed to terminate at the tip of the stylo-mastoid process. This suggested the idea that the extension of the growth to the middle ear had perhaps taken place by way of the stylo-mastoid foramen. This could hardly have been the case, however, as there was complete absence of facial paralysis.

July 25, 1877. The external wound in the neck has almost entirely healed, and the patient is now exceedingly anxious to have an effort made to remove the aural growth. The pain in the region of the ear continues, and the tumor has increased quite perceptibly in size. By means of a curved blunt-pointed knife, made expressly for this case, I was able to cut off quite a large portion of the growth. The bleeding was active, but not profuse. The patient was entirely unconscious of pain (etherized) during the cutting operation. As soon as the bleeding had ceased, I attempted to further diminish the size of the mass by gnawing away small portions with a miniature "rongeur." After one or two seizures I was obliged to desist, as the blood poured from the ear in a continuous stream, and the bleeding showed no tendency to stop of itself. The hemorrhage was readily arrested by stuffing the ear with cotton, and applying pressure by means of a bandage passed over the head and under the jaw.

The slippery character of the masses removed (like boiled sago) was a very noticeable feature ; and when broken down, the fragments did not show the slightest trace of possessing any fibrous tissue in their composition.

The *microscopic condition* of one of these masses from thin sections made by Dr. W. H. Porter of New York, stained with carmine, and mounted in Damar varnish, was as follows : With low powers it appears that the tumor is composed in part of *round, oblong, and branching alveoli* filled with medium-sized cells* which have imbibed the staining material quite uniformly and abundantly. Only here and there among these cells can the outlines of a still more deeply stained nucleus be distinguished. The *interalveolar tissue* occupies fully one half of the entire specimen. It has apparently not imbibed any of the staining material, though the round and oat-shaped nucleus-like bodies, scattered quite uniformly throughout its substance, are as deeply stained as the *epithelioid* elements in the alveoli. At many spots the stained nuclei seem to be surrounded by a perfectly colorless hyaline substance, sharply limited against the contiguous inter-alveolar tissue : in other words, *cartilage cells seem to enter largely into the composition of the matrix of the tumor*. All the blood-vessels encountered are of comparatively large size, and filled with blood corpuscles. At no point can I find distinctly fibrillated connective tissue.

Later on the day of the operation a second and very unsatisfactory effort was made to diminish the size of the growth. The copiousness of the bleeding, however, again obliged me to desist.

July 26, 1877. I introduced four red-hot needles in succession into the mass, with a view of diminishing the bleeding. As soon as the rongeur was used, however, the bleeding became as active as on previous occasions. Before I had reached the middle ear in my mining operations, I thought it advisable to abstain from further interference.

Soon afterwards a large abscess developed on the side of the neck, just below the mastoid process, and the patient was again transferred to Dr. Sands."

* *Statics* by Dr. H. K.

He soon returned to Ithaca and was treated by Dr. S. H. Peck, whom he had consulted in June, 1877. Dr. Peck writes: "In my opinion there existed a connection between the tumor of the neck and the growth in the ear, and I advised non-interference. Patient seen again August 14, 1877, considerably exhausted by his journey and the operation. He complained of paroxysmal recurrence of pain and inability to rest at night, which was relieved by morphia 0.01 gr. An indurated circumscribed tumor developed beneath the auricle and increasing slowly, carried the ear outward."

Oct. 25, 1877. I saw the patient again myself in consultation with Drs. Peck, Sands, and Buck. The auricle was considerably raised by a tumor underneath and around it, the size of a man's fist. The tumor was hard, uneven, filled the meatus, and showed several fistulous openings, discharging thin pus. Facial paralysis had existed for five days. As it was evident that the temporal bone in all its parts was invaded by the pseudoplasm, and as a radical removal was impossible, we consoled the patient as well as we could, stating that another operation would be too dangerous, but that tumors are sometimes seen to exfoliate by a kind of sloughing process, and a natural cure thus be effected.

He returned to Ithaca. The remainder of his sad history may be briefly told from notes of Dr. Peck and Dr. Parker. The tumor continued to grow in every direction. When its base was six inches in diameter, the cutis began to crack, causing excoriated, secreting surfaces partaking of the character of indolent ulcers which increased with the growth of the tumor. Nine months before his death, capillary hemorrhages began to occur from the denuded surfaces, and he lost about four grams of blood at every dressing. Repeatedly, however, "profuse hemorrhages from large vessels and by jets took place, usually in the forenoon, which Dr. Parker checked in a few moments without the least difficulty by dry pulverised alum, or persulphate of iron and other dry powders on cotton lint applied to the bleeding part." The local treatment consisted of disinfectant and astringent applications; the general treatment of anodynes at night and at intervals vegetable and mineral tonics. The patient's general condition during the growth of the tumor was good, his appetite was fair and he suffered but little pain. There was no enfoliation by sloughing in the circum-aural part of the tumor, but those portions of the intra-aural growth which protruded beyond the

external meatus always decayed in a short time. Progressive emaciation accompanied the growth of the tumor, death taking place from exhaustion, September 15, 1878, fifteen months after the first operation. Post mortem refused.

Dr. Peck describes the last stage of the tumor as follows :

"At the time of death the tumor measured in circumference at the base twenty-two inches, in the antero-posterior diameter eight inches, in the vertical seven inches. Its elevation over the surface of the skull was five inches. It extended anteriorly to within half an inch from the orbit, posteriorly nearly to the occipital protuberance, superiorly to the parietal eminence, inferiorly to the angle of the lower jaw. The ear, normal in size and appearance rested upon the external surface of the tumor, being carried outward by the tumor. In general appearance the tumor presented a lobulated form, viz : a superior, middle and inferior lobe, the superior being above the ear, the middle behind, and the inferior below the ear. Mastication was slightly interfered with, simply by the weight of the tumor. No protrusion of the growth into the bucco-pharyngeal cavity was noticeable. No mental disturbance."

Remarks.—The importance of the case may justify the foregoing somewhat lengthy description. It appears that we had to deal with an extra-aural and an intra-aural tumor. A connection between the two may be assumed, but, in the primary stage at least, was not proven. The aural portion, when first come to notice, was truly intratympanic, as demonstrated by the presence and incision of the unbroken membrana tympani. The microscopic examination proved both tumors essentially of the same nature ; a chondro-sarcoma (alveolar) or a chondro-adenoma, or chondro-carcinoma. The description of Dr. Buck corresponds most nearly to that of a chondro-adenoma* Since these tumors are common in the parotid region, and the external tumor had existed six years before the internal made itself noticeable to the patient, I, for my part, consider it most probable that the external tumor was primary, and extended to the middle ear. From the description it is evident that it occupied the locality of the base of the parotid gland, and I believe

* See Paget, *Lectures Surg. Pathology*, ii. p. 201.

that it probably started from the deep-seated portions of the gland, whereas the unaffected external portions lay over it like a capsule. Yet it has to be considered that Dr. Sands mentions that the tumor apparently lay beneath the gland, and Dr. Buck explicitly states that the parotis was not involved by the growth. The deep-seated portion of the gland occupies the posterior part of the glenoid fossa which is separated from the tympanic cavity only by a thin and somewhat porous plate of bone, and connected with it even by two canals, the canal of Huguier through which the chorda tympani, and the Glaserian fissure through which the ligamentum mallei anterior and the tympanic branch of the internal maxillary artery enter the tympanic cavity. I advised the removal of the external tumor, on the supposition that in this way the pseudoplasm also had made its way into the ear, and thought as stated above, that possibly the connection was more than microscopic, in which case the aural tumor might have been removed together with the parotidean from the posterior part of the glenoid fossa. At the operation no such connection could be traced, yet the whole history of the disease makes me still adhere to the opinion that there was a connection. Let me mention in support of this supposition that for a long time the simultaneous occurrence of intra-ocular and extra-ocular tumors was referred to separate and independent centres of formation, because no connection was detected between the tumors. Yet more careful microscopic investigation discovered in almost all cases the strings of elements of the pseudoplasm through the sclerotic, sometimes, it is true, in very slender and crooked tracks; yet the communicating links were there—though they had long escaped observation—despite the fact that the melanotic sarcomas, in consequence of the natural tinting of their elements, were an unusually favorable subject for such investigations. The same condition has been frequently demonstrated in other tumors. After describing an exquisite case of enchondroma of the scapula, Virchow* says: "The propogation took place through the connective tissue, as has

* Morbid Tumors, vol. i. p. 490.

later been observed in a similar manner in other cases, and *as it is invariably and very distinctly seen in enchondromas of the soft parts.*"

The radical removal of malignant or conditionally malignant growths of the tympanic cavity either from the glenoid fossa or from the external meatus or mastoid region may be an unusually difficult surgical performance, from which, however, in appropriate cases, we ought not to shrink. By chiseling the bony walls of the meatus and the outer plate of the mastoid process away, which can be, and has at least partially been, done with safety, we gain sufficient space for manipulations in the middle ear.

The literature on malignant intra-aural tumors is scanty. It is compiled by Schwartz at the end of his paper on "A case of primary epithelial cancer of the middle ear," in the ninth volume of the *Archiv. für Ohrenheilkunde*, p. 208, etc. 1875, and in his "Pathological Anatomy of the Ear;" translated into English by G. O. Greene, p. 29, etc. 1879. It comprises nineteen cases, to which is to be added a case of primary epithelial cancer of the petrous bone by Lucæ (*Arch. für Ohrenh.*, xiv, p. 127) 1878, and the case of Delstanche (*Arch. für Ohrenh.*, xv. p. 21) 1879, though it originated in the external auditory canal. Since Schwartz gives only the bibliography of the cases with notes on some of them, it would be a thankful task critically to review them as to their origin, course, termination, nature, and treatment. Such a review, apart from its scientific value and usefulness, could scarcely fail to lead to some practical suggestions as to the operative removal or destruction by caustics and heat of these otherwise invariably fatal affections.

The parotid tumors are briefly, but very instructively described by Paget (*Lectures Surg. Path.*, i. p. 201), etc.; exhaustively, however, and with a very extensive bibliography they are treated by Virchow in his large work on tumors, in the chapter Chondromata (vol. i. p. 435, etc.). In this place the old controversy as to the origin of the tumors in the region of the parotid is clearly discussed on the basis of many observations and researches, and I beg leave to quote

from it a passage bearing upon the case under consideration. On page 512, Virchow writes: "Bruns who maintains the extra-glandular origin of a part of the so-called parotid enchondromas, states that just the sub-auricular enchondromata originate in the gland. Possibly these contradictions will be solved by the demonstration that some of the enchondromas in this region are of extra-glandular, others of intra-glandular origin. This supposition is supported not only by decided statements of authors, but also by the fact that the same region is the favorite seat of subcutaneous myxomas, fibromas and kystomas. At any rate my own investigations prove beyond a doubt that the intra-glandular origin of enchondroma occurs in its most perfect type just in the salivary glands."

ON SCLEROSIS OF THE MASTOID PROCESS.

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I HAVE already pointed out in a paper "on the perforation of the mastoid process," (v. Langenberck's Archiv, Bd. xxi, H. 2), great variations exhibited in the development of the cell-spaces of the mastoid process, since in some cases the bony foundation, in others the cells predominate. At the same time, I have claimed that we may find hyperostotic processes without demonstrable pathological causes. While Bezold * says that we may often find in aged people that the mastoid process consists of compact substance without air-cells, excepting the antrum and its adjoining cells; Wildermuth † maintains that mature age has no constant influence upon the expansion or contraction of the cells. In seventy adult skulls of varying ages, I found but one pronounced hyperostosis of the mastoid process, and on one side only, while on the other there were air-cells. On the other hand, inflammatory processes which spread from the tympanum to the mastoid process, may often lead to a hyperplasia of the bony foundation, and so to complete sclerosis. Such cases are frequent, but not often reported. Schwartz ‡ says: "Sclerosis is a frequent sequence of chronic purulent inflammations of the middle ear, the cells gradually contracting and finally

* *Arch. für Ohrenhklde.*, xiii. p. 48.

† *Zeitschr. für Anatomie und Entwicklungsgesch.*, ii. p. 331.

‡ *Handbuch der patholog. Anatomie.* Klebs. *Gehörorgan*.

disappearing; the diploe also between the external and internal tables at the top and inner walls of the process becomes filled with bony masses. The coricalis also becomes thickened by deposit of bone on the outer surface."

Sclerosis is most often observed during operations on the mastoid, rendering them difficult or hindering an entrance to the antrum. During post-mortems, but slight attention is usually given to the state of the mastoid process* although more should be given considering the importance of sclerosis to our prognosis of the morbid process complicating inflammations of the middle ear, as well as in reference to operations on the mastoid process.

Experience and observation show that sclerosis may be of two varieties; first, as idiopathic, chronic periostitis, and otitis interna of the mastoid process, developing itself after the cessation of a tympanic inflammation: second, as a morbid process developing itself side by side with an inflammation of the tympanum, and then remaining stationary or advancing simultaneously with the advances of the latter.

I. Idiopathic chronic sclerosis of the mastoid process.

CASE I. *Inflammation of both middle ears in the course of typhus abdominalis, with persistent, violent pains in the mastoid region after the fever had ceased. Death from phthisis pulmonalis. Sclerosis of both mastoid processes.*

W., æt. 26, two years before her death had an attack of typhus, with development of otorrhœa on both sides, and later of a lung disease of which she died. Violent pains persisted in both ears after the typhus, and were operated for in the left ear, a large amount of pus being discharged from the meatus after the puncture. For a fortnight after, the patient suffered from very violent pains, and repeated convulsions ensued. These pains have appeared at various periods since, lasted eight to fourteen days and then again abated. Independent of these pains she had often had otorrhœa with evacuation of a slight amount of purulent secretion.

* Moos: (*Arch. für Augen und Ohrenheilkunde*, Bd. i, 224), in speaking of an autopsy says: "The cells in the perpendicular portion of the mastoid were but little developed. This condition is frequent after chronic purulent inflammation of the middle ear, and is due to chronic inflammation of the lining of the cells."

On presentation, the patient was in the midst of a renewed attack of pain in both ears: secretion from the ears was absent; the right memb. tymp. was still preserved; in its centre a depressed translucent spot. The left memb. tymp. had a perforation in the anterior lower quadrant through which the reddened mucous membrane of the labyrinthine wall could be seen. Hearing: *L*, watch 10 cm., *R* 18 cm.: voice, *R* 8 m., *L* 1 m. The mastoid region was slightly red and barely sensitive to pressure. The pain was described as below the surface of the mastoid process. During a long stay at the hospital the pains came and went, narcotics being of no avail. The patient being now far gone in phthisis, the operation that might have relieved the pains was abandoned.

The post-mortem examination showed the usual changes in the tympanum after purulent inflammation. Two vertical sections were made through the mastoid process, one 6 mm., the other 12 mm. behind the spina. The posterior segment showed the antrum of normal size and completely surrounded by a sclerosed ring of bone, 6 mm. thick. The cell system was only indicated by a few small spaces resembling spongy bone-tissue. The sclerosis of the anterior segment extended to the outer surface of the process, and the bone between the antrum and meatus was completely sclerosed. The walls of the right antrum were covered with a small amount of muco-serous fluid, and the cells were sclerosed with exception of a few cavities varying in size from that of a pea to that of a pin's head. The outer surface of both mastoid processes was healthy.

This is the first case, I believe, where the autopsy has proved that, without inflammation in the tympanum, without pus in the mastoid portion, and without distinctive disease of the bone, the most violent pains may ensue, so violent that had the state of the patient allowed, I would have perforated the mastoid process.

Dr. Wendt's experience seems to help us in judging the origin of this disease to be an inflammation of the mucous membrane of the air-cells, leading to sclerosis of the bone. A review in *Archiv. für Ohrenhklde.*, vi. 293, says: "Dr. Wendt often saw at autopsies the cells of the mastoid process filled with their swollen mucous membrane, so that their cavities were quite abolished. It seemed as if the mucous membrane must be tightly squeezed and that this state

was probably accompanied by violent pains. In one case during acute purulent inflammation of the middle ear, where the pains had lasted weeks, and were attributed to the mastoid region, he suspected pus and operated with Middel-dorf's acido-peirastic drill. Although the cavities in the bone, such as they were, were opened, no pus was evacuated and there was no demonstrable communication between the wound and the tympanum."

We cannot doubt but that the sclerosis is developed by such a morbid process as Wendt observed, and which seems analogous to the densifying otitis (Volkmann), of other bones of the body. The excessive pains are caused by the persistent inflammation in the bone, sometimes giving the patient the most terrible anguish. Our operative experience proves that these pains are caused by the morbid process in the mastoid portion. Just as Wendt relieved the pain by boring at an early period of the disease, and hastened a cure, our experience proves that a simple boring into the mastoid process without opening a cavity or evacuating a secretion can stop the inflammation and make the symptoms cease. Buck reports similar cases (*Archives of Ophthalmal. and Otol.* iii. 172), and Schwartz's forty-seventh case (*Archiv. für Ohrenhklde.*, xiii. 249), is very instructive. This was the case of a woman who had had otitis acuta. A few weeks later, she suffered from violent inflammatory pains in the mastoid process, which were in vain opposed by repeated incision down to the bone. The tympanum and memb. tymp. were free. The mastoid process was chiselled on account of suspected pus. Neither cavity nor pus were found in the very hard bone, even at a depth of 2 cm. The operation relieved the pain completely. Schwartz and others have in the same way relieved pains localized in the mastoid process, in connection with inflammatory processes in the tympanum, without even opening the antrum or evacuating pus.

To sum up:

Sclerosis can appear as an idiopathic disease of the mastoid process, after cessation of inflammation of the middle ear, and cause the most violent pains:

Practice proves that the symptoms of violent pains, in connection with idiopathic sclerosis, can be relieved by opening the mastoid process.

II. Sclerosis as a complication of inflammatory processes in the tympanum.

CASE 2. Inflammation of the middle ear lasting for years with repeated acute exacerbations. Death from purulent meningitis and abscess of the brain. Cholesteatoma in the tympanum and antrum; sclerosis of the mastoid process and caries of the roof of the tympanum.

Dorothea M., æt. 34, had had otorrhea, *left*, since childhood, and suffered repeatedly from violent pains in the ear, which would disappear after a few weeks. During nearly every subsequent summer, she had one or more attacks of excessive discharge from the ear, with the same pains. During these attacks she could do no work, and tried bleeding, blisters, etc., etc., on the mastoid process where the pain was most violent, but all in vain. There was never any swelling behind the ear. She complained at intervals, of dulness of the head and pain in the left temple. Six weeks before entering the hospital, she had chills and feverish symptoms, and an intense pain in the left temple, but no convulsions or cerebral symptoms. After application of ice-bags to the head for eight days, she went to housework again, with a dull pain in the left temple. Four days before her second reception to the hospital, the symptoms returned as before with delirium and unconsciousness, which lasted till December 18, 1877, when she was brought to the hospital, where she died on the following day after exhibiting marked cerebral symptoms.

At the autopsy, the anterior portion of the left hemisphere was found covered with pus, which extended to the base of the brain. The dura mater over the left tegmen tympani was discolored, and pierced by a few openings, beneath which a cavity full of pus was seen. The pus being removed, the tegmen was found to be perforated by a few small orifices which led into the tympanum. An abscess in the brain was discovered, corresponding in situation with that over the tegmen, and extending into the lateral ventricle, which, with the right and middle ventricle was filled with purulent fluid. The rest of the brain was normal, but the whole spinal

cords was surrounded by pus, resting on the pia mater and extending on the roots of the nerves to their exit.

A vertical section was made through the mastoid process behind the auricle, and the anterior wall of the tympanum was removed with preservation of the memb. tymp., and the contents of the tympanum. The memb. tymp. was intact with exception of a small opening above and behind. The sulcus tympanicus had suffered from slight carious loss of substance at a spot corresponding to the opening in the memb. tymp., and this cavity was filled with a polypus springing from the mucous membrane of the tympanum just in front of the entrance to the antrum. The antrum was full of whitish scales, and had increased in size. Both tegmen and antrum were perforated by small openings which led into the middle cranial fossa. The enlargement of the antrum had reduced the thick plate of bone (3-4 mm.) between the antrum and the meatus to a mere translucent shell.

The scales in the antrum and tympanum were examined microscopically, and found to be composed of large epidermoid cells, with a few crystals of cholesterin, such as are peculiar to cholesteatoma, or pearl tumor, of Virchow.

The mastoid process in the neighborhood of the antrum was completely sclerosed, the whole portion between the outer wall of the antrum and the surface of the mastoid process being especially free from cells, while the summit showed only a few traces of network tissue.

CASE 3.—Chronic otorrhœa on the left side: Caries of the petrous bone: Entrance of pus into the posterior cranial fossa: Meningitis purulenta: Small abscess of the brain.

S. E., a glazier, æt. 30, had had otorrhœa, *left*, for fifteen years. Three weeks before his death he was attacked with violent pains in the left half of his face, which led to facial paralysis; later, he suffered from extreme pain in the whole head. The left facial nerve could not be excited. Pus discharged from his left ear. A perforation in the memb. tymp. was filled with a polypus. The temporal bone was not particularly painful. The autopsy showed purulent meningitis of the posterior cerebral fossa and an abscess as large as a walnut in the left cerebellum.

A vertical section was made through the mastoid process between the posterior wall of the meatus and petrous bone, and he tegmen tympani was removed. The bony wall of the facial

canal was wholly destroyed at its point of curvature, and from this spot, two carious passages led backward, separated from the middle cranial fossa by a thin plate of bone. The outer passage ran backward in the angle formed by the upper vertical and horizontal canals, the other ran over the promontory and inward from the upper semi-circular canal, while both were united, in that the bone embraced by the upper semi-circular canal was also destroyed by caries, showing a passage as large as a quill. The canal itself was preserved, and enclosed in bone that was still 1 mm. thick. The carious canal embraced by the semi-circular canal continued inward, and led by many small openings towards the posterior cranial fossa, into a triangular fissure, near the meatus auditorius, the hiatus subarcuatus of v. Trölsch.

The mastoid process was completely sclerosed, with exception of a small cavity very near the antrum. The base of the middle cranial fossa was a little lower than the linea temporalis, which I regard as a depression of this fossa.

CASE 4.—Otitis purulenta dextra for years : Caries and necrosis of the petrous bone : Sclerosis of the mastoid process : Meningitis purulenta : Thrombosis of the sinus transversus.

George H., æt. 13, had otitis purulenta since infancy, and a fortnight before his reception to the hospital (June 10, 1878) had all the symptoms of meningitis. The mastoid region began to swell and was incised, evacuating discolored and offensive pus. The symptoms continued unabated, and the patient died on the tenth day, after delirium and coma.

The autopsy showed yellowish, circumscribed patches of pus scattered over the surface of the brain, and extensive patches of purulent infiltration at the base of the brain, especially at the right side at the cerebellum. A large abscess cavity was found near the angle of the temporal bone, spreading over the middle cranial fossa, and a portion of the posterior surface of the petrous bone. Pus was also found beneath the dura mater of the sella Turcica and left, middle cranial fossa. The transverse sinus contained purulent masses and thrombi. A section of the mastoid process was made 8 mm. behind and parallel to the posterior wall of the meatus. A large part of the tegmen tympani was necrosed. A carious canal as large as a quill ran from the tympanum beneath the labyrinth, and its anterior wall was but 2 mm. distant from the carotid canal. It led into a cavity close behind the transverse

sinus, and a few minute canals could be seen leading backward from the cavity. The whole region surrounding the antrum mastoideum was found completely sclerosed.

Three of these cases showed both sclerosis of the mastoid process, and caries in the tympanum: in Case 1, perforation of the tegmen tympani, and in Cases 3 and 4, carious canals leading to the posterior cranial fossa. The question, therefore, that we have to consider is, whether we could here have interfered therapeutically and saved life.

In Case 2, we might have removed the polypus and cholesteatoma by forcible syringing, and so prevented death,* or we might have opened the mastoid process exposing the antrum and tympanum, which could best have been done by chiselling away the posterior wall of the meatus, and so gained a cure. We cannot conclude from this single case, that the frequent acute exacerbations, with pain and inflammatory symptoms, indicate the need of an operation. Bezold's case † goes to show that under similar circumstances, we may have a spontaneous cure, in so far as the cholesteatoma eat away, in an outward direction, the capsule of bone by which it was surrounded. Bezold made an incision into the bulging posterior wall of the meatus, and found the bony wall wholly eaten away, so that the cholesteatoma could be removed through the opening. In our case, however, the wall was only eaten away to a thin plate; the process extended towards the interior of the cranium, before it had penetrated into the meatus. Hence we cannot rely upon such a spontaneous cure, but must interfere operatively as early as possible; *i.e.*, as soon as we suspect cholesteatoma, and cannot remove it in the usual way.

In Case 3, a polypus resting in the perforation of the memb. tymp. probably retained the secretion which favored the development of the destructive process. An early removal of the polypus and secretion might have prevented

* In syringing the tympanum and antrum to remove thickened masses, I use a German-silver tube bent at a right angle near its end, and introduced into the tympanum under control of the mirror. An India rubber tube unites the silver tube with the syringe, so that the to and fro motion of the syringe during its use is not communicated to the tube, lying gently in the tympanum.

† *Archiv. für Ohrenhkte.*, iii.

death. The extension of the caries is especially interesting in that it advanced towards the posterior cranial fossa, along the vessels coursing beneath the upper semi-circular canal, and which run from that fossa to the middle ear. These vessels arise from a deep groove, which in early life curves forward from the posterior cranial fossa beneath the upper semi-circular canal. In later life, this groove is only indicated by the hiatus subarcuatus. v. Tröltsch* believed that in one case, these vessels had a decided share in transmitting the inflammation from the interior of the temporal bone to the cavity of the skull, and mentioned similar cases seen by Voltolini and Odenius. Case 4 could not have been one of caries due to retained secretion in the tympanum, for the memb. tymp. was destroyed. An artificial opening of the mastoid process before the appearance of the meningitis, might have removed the symptoms due to sclerosis, but could not have laid bare the carious canals leading from the tympanum, or made them accessible to cleansing or disinfecting fluids.

In all four cases the sclerosis limited itself to the interior of the mastoid process, and it was impossible to demonstrate any deposit of bone, or increase of volume in any direction. This fact is worth remembering, that in making an artificial opening into the mastoid process, we are not as a rule to expect to find any deposit of bone on the surface. In these cases, therefore, we cannot penetrate deeper than the normal anatomical relations allow, if we would avoid opening the labyrinth, and wounding the facial canal as, practically speaking, Schwartz once did in penetrating 3 *cm.* forward in a case of sclerosis.

As regards the limits of the operation to avoid opening the cranial cavity and sinus transversus, I must coincide with Bezold in laying stress on the frequent occurrence of an excessive curvature of the sinus, and I have also succeeded by making my sections perpendicular to the axis of the auditory meatus, in fixing the relations of the middle cranial fossa in the operation. As the canal that I fixed on

* *Archiv. für Ohrenhklde.*, iv. 128.

the cadaver for operation with the drill * proves too narrow for operating on the living, Schwartz enlarges the canal, Wolf proposes that we chisel the posterior wall of the meatus, and Bircher of Aarau (*Inaug. Dissert. Bern*, 1878) has drawn the conclusion that we must proceed in every case according to the state of the parts concerned.

In Cases 2 and 3, where an abscess of the brain ensued, it should be noted as important, that the memb. tymp. was almost entirely preserved, and the existing perforation filled with a polypus. Hence there could be no doubt but that the secretions were retained, inducing probably the destruction of the bone, and the appearance of the abscess; at all events favoring its development. Lebert, in his work on abscess of the brain (*Virchow's Arch.* x) says that we cannot make it a rule, that brain symptoms appear after suppression of an ear discharge. I would add that an otorrhœa may continue, and yet the secretions may be retained. It seems in many cases, when the perforation is not completely stopped up, as if a sort of filtration took place, the firmer constituents of the secretions remaining, and the fluid constituents continuing to escape.

* Schwartz (*Archiv. für Ohrenhklde.*, xiii. 95) thinks it "very surprising" that I recommended an auger-shaped instrument for opening the bone. Any one who looks over my article will see that I mention expressly "that the same spot must be chosen when a chisel is used." I have therefore left the choice between the drill which Jacoby recommends as harmless, and Schwartz's chisel.

ON A TRAUMATIC, MOVABLE HAEMATOMA OF THE MEMBRANA TYMPANI.

BY PROF. S. MOOS, OF HEIDELBERG.

Translated by JAMES A. SPALDING, M. D., Portland, Me.

October 26, 1878, C. R., æt. 48, a locomotive engineer was seen for the first time and gave the following history :

While driving an engine August 22, 1878, an empty bottle was thrown from a train going in the opposite direction, hitting him obliquely on the left cheek, temple and auricle, but causing merely an external abrasion of the skin of the cheek and upper third of the helix. Ever since then he has had continuous tinnitus in the left ear, dizziness towards the left, and head-aches. The hearing was completely lost.

October 26th. The right ear showed injection of the vessels of the manubrium, and opacities of the mucous membrane of the memb. tymp. Left, an ochre-yellow, concave and oval discoloration was seen occupying the posterior and upper quadrant of the memb. tymp. and giving the impression as if it were seen on the labyrinth wall through a very thin memb. tymp. On rarefying the air in the meatus, this spot moved distinctly, so that there could be no doubt of its *seat in the memb. tymp. itself*. The light spot was absent, and the mucous membrane slightly opaque. The patient suffered from excessive nasal catarrh.

Hearing: whisper, both ears, 0: Loud voice, *R, 1 m, L, 0*: Acoumeter both, 0: Bone conduction for acoumeter 0: for tuning fork A, 0: for C' and C" on *R.* only.

Both ears, therefore, had probably been affected previously to the accident, and probably from a chronic catarrh of the middle ear of both sides in varying degree. Leaving aside the possible alterations caused by this disease, our diagnosis for the left ear,

rested on a traumatic blood-extravasation (now undergoing transformation) into the layers of the posterior and upper quadrant of the memb. tymp., and a simultaneous lesion in the labyrinth—perhaps another extravasation—since the hearing on the wounded side was wholly lost.

The patient used the following prescription till December 7th, in tablespoon doses three times daily: Potass. iodidi 5.0; potass. bromidi 15.0; aquae destil. 200.0. *During the following treatment, lasting many weeks, the left ear was spared all local treatment.*

Injections of zinc 0.60 : 100 were applied every few days, *R.* by the catheter and in ten days *H.* was 2 *m.* for voice. November 5th, the tuning fork *a* was heard *L.* for the first time at 3 *cm.*; for voice 1 *m.*; and soon after 2 *m.* In the mean time a severe angina tonsillaris set in, and was treated with argent nitr. 1:30, and alum as a gargle. The nasal douche was also employed from time to time. The oval, yellow spot moved backward gradually, a portion seemed to extend to the upper wall of the meatus, and the portion of the memb. tymp. between the posterior border of the manubrium and the anterior border of the exudation assumed a normal appearance.

November 19th: *H. L.* voice 4 *m.* Tuning-fork *a* 3 *cm.* *C'* 5 *cm.* *C''* 10 *cm.* Bone conduction for *C'* and *C''* with left ear closed.

November 21th: *H. L.*, voice 5 *m.* The colored spot was punctured and the contents being examined microscopically, proved mostly yellow, homogeneous, clotted and fibrous, containing a few reddish-brown crystals of haematoidin.

December 3d: *H. L.*, voice 11 *m.*

December 5th: whisper, *R.*, 1 *m.*, *L.*, 50 *cm.* Voice *R.* 13 *m.* *L.*, 11 *m.*

December 10th: whisper, both, 1 *m.* Acoumeter, both, 4 *cm.* The tinnitus is constant but diminished in intensity. The vertigo, of which he had several attacks during the treatment indicated, has almost disappeared. The extravasation of blood lies very eccentric, a smaller portion still on the posterior periphery of the memb. tymp., but still united with the larger part which lies along the neighboring part of the meatus. As the hearing remained alike in both ears, I supposed it now to be about as good on the left side as before the wound, and so suspended treatment. I could not make up my mind to local treatment of the left ear, so long as the vertigo and subjective tinnitus were still present,

referring them as I did to a lesion of the labyrinth, because they had not been present before the accident.

Traumatic influences usually cause a rupture of the memb. tymp., and more or less violent bleeding, which in our case was absent, while the rupture took place between the lamellæ, but whether between all of them we were unfortunately unable to decide. At all events this was a hæmatoma of the memb. tymp. with its fluid constituents wholly absorbed in the two months that had intervened between the time of the accident and the patient's first visit.

The horizontal wandering of the exudation deserves still higher interest, considering its firm consistency, and corresponds with cases seen by v. Tröltsch and Politzer; the former being the first to call attention to wandering pigment spots of the memb. tymp. from the posterior half towards the meatus, while Politzer noticed the wandering of an india-rubber eyelet to the periphery of the memb. tymp. I will mention a similar case: February 19, 1878, I made a paracentesis in the lower quadrant for a serous exudation into the tympanum, and afterwards saw the circular scar wander upward over the short process to Shrapnell's membrane, when the patient no longer reported. In this present case, considering the tests of hearing, the vertigo and subjective noises which had never been present before the wound, there can be no doubt of a simultaneous lesion of the labyrinth. A simple concussion cannot be admitted, for the functions were still totally absent two months after the wound. It is much more probable that there was a simultaneous extravasation of blood in the labyrinth also, with more gradual and slower resorption of its fluid constituents.

This view would explain on the one hand why at least some improvement in the symptoms ensued; on the other hand the supposition of a continuance of similar remains of the exudation, as in the memb. tymp., would teach us in regard to the persistence of a portion of the symptoms, such as tinnitus, vertigo, etc. Whether these will disappear with time, is conjectural. From my experience, so far as concerns the total disappearance, or the improvement of

the disturbances in the organ of hearing ensuing upon traumatic influences, I must confess that I was astonished at even the proportionally slight improvement that ensued. For I have as yet never seen an improvement, or rather a perfect cure, in any case of *traumatic* lesion of the labyrinth, no matter what the treatment employed. Every one will surely agree with me in shunning all treatment of the middle ear of the wounded side.

If I had been requested to give a legal opinion I should have been forced to say that the wounded organ at the time of the wound was in the greatest probability no longer in a normal state. The negligence of the person who threw the bottle would have been none the less, although the damages so far as concerns lasting injury, etc., would from this very probability have been much milder.

Judging from my own experience in one-sided wounds of the ear, which become the subject of legal damages, I cannot too urgently advise accurately to test the functions of the unwounded ear. If this were always done, we should not so often be guilty of a sin of omission to the great prejudice of the defendant.

It is very doubtful if our patient ever drives a locomotive again, owing to his inclination to vertigo, leaving entirely out of the question his diminished hearing.

SYPHILITIC DISEASES OF THE INTERNAL EAR.
BEING A REVIEW OF SOME RECENT PAPERS
UPON THIS SUBJECT.*

By D. B. ST. JOHN ROOSA, M.D.

In 1877, I published some cases of what seemed to me to be a disease of the ear, chiefly if not entirely affecting the labyrinth. I even ventured to express the opinion that the principal seat of the lesion in these cases, was probably to be found in the Cochlea, and the name Syphilitic Cochlitis was given to the disease.†

Lest I might be misunderstood as supposing that diseases of the *internal* ear of syphilitic origin, were more common than those of the *middle* ear from the venereal disease, when incorporating this paper into the last edition of my work on the ear, it was stated that "it should not be forgotten that syphilitic affections of the middle ear are perhaps more common than those of the labyrinth." This point is made early in the discussion in order that the statement made in the beginning of one of the papers I am about to review may be met in advance. This statement is, "the prevailing opinion has been that the seat of the lesion is usually in the labyrinth." I do not think that the prevailing opinion of our day has been, that the seat of the lesion of the ear in syphilis is usually in the labyrinth, but rather that it is sometimes, perhaps *often*, found there, and in the cases of "sudden deafness" almost always.

* The Relations of the Conducting Mechanism of the Ear to Abnormal Hearing. By Samuel Sexton, M.D. Transactions of the American Otological Society, 1878. Syphilitic Affections of the Ear. By Albert H. Buck, M.D., American Journal of Otology, vol. i, no. 1. The Sudden Deafness of Syphilis, with Cases. By Samuel Sexton, M.D. American Journal of the Medical Sciences, July, 1879.

† *Medical Record*.

In January, 1879, Dr. A. H. Buck published a paper upon "Syphilitic Affections of the Ear." In this interesting article, Dr. Buck makes four distinct classes of these cases: 1st, those of the auricle and auditory canal; 2, of the middle ear; 3, of the auditory nerve; 4, of the middle ear and auditory nerve. At the close of his article, after having given cases that seemed to belong to each of these heads, Dr. Buck makes use of the following qualifying language: "With regard to the cases in which the auditory nerve, either before or after its entrance into the labyrinth, is the part believed to be principally affected by the constitutional disease, I find again that my material is far too scanty and too imperfect to justify any special conclusions. In these cases it is generally assumed that the labyrinth is the seat of the syphilitic lesion. It is quite possible, however, that the lesion may be in the middle ear, or in the auditory nerve before it enters the labyrinth." * * * "Lesions at the oval window, by obstructing the actions of the stirrup, would likewise be competent to diminish very materially the power of hearing."

The author further states that lesions in the meatus auditorius internus and in the minute openings of the *cul-de-sac* of the meatus and in the bony channels of the modiolus, might produce changes in the functional capacity of the filaments of the auditory nerve. The conclusion is then reached, apparently in contradiction of preceding statements, that "we are hardly justified in using the expression labyrinthine disease, except in those cases where demonstrable lesions are found in this part of the ear at the post mortem examination. At the same time, it is difficult to suggest a better term even for temporary purposes."

In the July number of the *American Journal of the Medical Sciences*, Dr. Samuel Sexton published an article entitled "The Sudden Deafness of Syphilis, with cases," in which, after the opening statement, that has already been quoted, it is said that "Better knowledge of the disease (syphilis of the ear) seems to lead to the conclusion that its chief, if not entire location, is in the middle ear and its conductive mechanism." This paper is a sequel of one published in the *Transactions of the American Otological Society* for 1878, by the same author, for there, at the close of an argument against the idea that the labyrinth is often the seat of the disease, it is asserted in italics that the "sudden deafness of syphilis has, beyond doubt, its principal seat in the conducting mechanism."

In the *Medical Record* for September 20, 1879, Dr. Sexton's views are reproduced with all the *ex-cathedra* importance of an editorial article, and a review of a book upon the Ear, with the same inspiration and the same dogmatic assertions in regard to this subject, has just appeared.* These are evidences of a systematic attempt to establish, upon the dictum of one author, questions, which, to say the least are not yet settled, and about which there is yet room for difference, however strongly it may be asserted that "better knowledge" has overthrown the opinions of those who believe that the labyrinth and the auditory nerve are sometimes the seat of a lesion in syphilis, which causes sudden deafness. I have felt bound to go over the whole subject carefully again, and determine if possible, whether it was time for those of us, who had believed that syphilis does sometimes invade the labyrinth and auditory nerve to change our views. As the best way of reaching the subject, I shall review Dr. Sexton's papers, in as brief a manner as the subject will allow.

After the statements already quoted, the paper continues with a reference to Mr. Saunders' views on this subject.

Saunders was perhaps the best authority of his time, but his means of diagnosis were poor, and his cases are not reported with sufficient exactness to make them of any value whatever in this discussion. They simply show that certain persons were relieved of impairment of hearing and tinnitus, after using mercury and sarsaparilla. He is however forcibly struck with the congruity of deafness produced by syphilis, and that which was generally described in his time as nervous deafness. Granting that Saunders' cases of nervous deafness were really such, there is some value in his argument; but, as I have intimated, we are obliged to reject his testimony because in common with the old authors, until the time of Wilde, the data from which his opinions are formed, are not given with sufficient exactness. So far as they go, they are decidedly against Dr. Sexton's views. Iconoclastic as it may seem, I think it would be better for science if all otological literature up to the time of Wilde were rejected, except so far as it may have a historical value in telling of the failure of the ancients to make exact observations in this department. Of course I am here speaking of therapeutical literature, and not of the anatomical works of Eustachius, Valsalva, Monro, and a few others. It would save a great deal of type if we began our discussions with the

* *American Journal of Otology*, vol. i, no. 4, p. 292.

opinions of the men who first observed aural disease in a thoroughly objective manner.

Sir William Wilde is next quoted by Dr. Sexton at some length as an author who sustains his view, or to put it in the writer's own words, he "more nearly approached a solution of the syphilitic affections of the tympanum," which this paper is intended to describe. Again, "but his description comes very near reaching the disease, as it is now believed to exist in the middle ear." Wilde describes "an inflammation of a specific character occurring in the membranes of the tympanal cavity, but chiefly exhibited in the external membrane of the drum."

Dr. Sexton after these words, quotes Wilde as regarding this disease as an affection of the *membrana tympani only*. This is a mistake, for as I long since showed, although Wilde called affections of the middle ear by the name of myringitis, because he believed the *membrana tympani* was chiefly affected, he never was so ignorant of pathology as to suppose as is said here, that this membrane *only* was affected. He knew perfectly well that his chronic myringitis was an affection of the middle ear. Wilde's language is "The disease which I am about to describe is an inflammation of a specific character, occurring in the membranes of the tympanal cavity, but *chiefly exhibited* in the external membrane of the drum."* Whatever Wilde may have thought, he is far from denying that there may be a syphilitic cochlitis, or inflammation of the labyrinth; he is simply describing a disease of the middle ear. He not only came "very near;" but he actually described cases of deafness, arising as he thought from lesion of the middle ear only, some twenty-five years before our time. There is no evidence as to what he thought of the possibility of syphilis invading the labyrinth. I do not think that he can fairly be quoted in such a discussion as this, for he seems to have expressed no opinions germane to it.

Since the time of Wilde however, I believe we have been able to classify aural disease more accurately, and consequently that we have been able to recognize some well defined affections of the labyrinth from syphilis and other causes, in a much clearer manner than had before been done.

Schwartz is the next authority quoted, and this is to show that nothing has been done by pathologists in the lesions of the labyrinth. The words quoted from Schwartz are, "what has been

* Aural Surgery, London, 1853, p. 261.

done by some in this field of late years with the most earnest endeavors, is scarcely more than a sad dilletanteism, and has no value for science."

I think this isolated quotation of Schwartz gives an unfair idea of his opinions. It is taken from the introduction, and the qualification "some" shows of itself that Schwartz believes that good work has been done even in the pathology of the labyrinth, for if we turn to page 156 (of the translation), we find a classification of the diseases that cause hyperæmia of the labyrinth. They are "typhus, puerperal fever, acute tuberculosis, etc. It may occur in acute and chronic inflammations of the tympanum, in meningitis and congestions, in disturbances of the circulation from various causes, and also from disturbances in the vaso-motor innervation." Dr. Sexton also quotes Schwartz as saying that even in the most acute affections of the tympanum, a simultaneous hyperæmia of the labyrinth *is* met with only exceptionally. What he actually says is this: "*From my own anatomical investigations a simultaneous affection,*" etc., "*was met with only exceptionally.*" He is very far from asserting that others may not have met with it. Indeed, he states in a foot-note to the very sentence quoted by Dr. Sexton, that Hinton, an author who needs no approval of any otologist, has met with hyperæmia of the labyrinth forty times. Then again in Dr. Sexton's quotation of Schwartz's opinion, that an independent and primary, non-traumatic inflammation of the membranous labyrinth has not yet been anatomically and certainly demonstrated, the foot-note is omitted in which Biechy and Batissim claim to have found such an inflammation on dissection, and Schwartz's opinion that "from clinical observation it is probable that an acute primary and independent inflammation of the inner ear occurs not infrequently" is also omitted. But more than all this, Schwartz, l. c. p. 158, gives a case which was under his observation in 1877, and which afterwards came to dissection, which, to use Schwartz's own language, "places the existence of a *primary acute purulent inflammation of the labyrinth* without suppuration of the middle ear beyond all doubt."

But whatever Schwartz may say, good work has been done by several men in investigating the lesions of the labyrinth. They have shown that the membranes of the labyrinth may and do undergo thickening, atrophy, that hemorrhage may occur into the labyrinth, that gummy tumors may occur in the meatus auditorius internus. Granting this, it seems to me almost absurd

to believe that in certain syphilitic cases, like aural lesions may not possibly have occurred. Is it probable, nay, possible, that the labyrinth has been entirely excluded from the effects of syphilis, any more than have the retina, the optic-nerve, or the membranes of the brain?

This is an important point in this discussion, for if I correctly understand the drift of Dr. Sexton's paper, he believes that we should not seek nor expect a lesion in the labyrinth, when we may possibly explain the symptoms by reference to the middle ear, and that we may nearly always thus explain them. But we are not entirely without positive evidence that the labyrinth is invaded in the course of syphilis. Moos reported* a case of secondary syphilis, in which deafness, annoying tinnitus aurium and osteo-copic pains in the skull were complained of. The hearing was rapidly destroyed. Death. At the autopsy the right external and middle ear were found intact, sclerosis of the petrous portion of the temporal bone, periostitis in the vestibule and small-celled infiltration of the membranous labyrinth, anchylosis of the stapes to the fenestra ovalis. Trunk of the acusticus unchanged.

Gruber has also reported a similar case.† The argument of the present writer has been, that if we observe symptoms such as were seen in cases where lesions of the internal ear were actually discovered on a post-mortem examination, and if we also find that the ordinary treatment for disease of the middle ear has no effect, while that which has been successful in brain lesions is also successful here, we are justified in assuming that we are probably dealing with an affection of the labyrinth, although we cannot substantiate our opinion by an ocular examination of the parts involved.

We have no quarrel to make with Dr. Sexton's next statement, that a specific character may be "engrafted" upon a simple catarrhal inflammation, but we cannot agree with the inference that when a catarrh is modified by syphilis, sudden and absolute deafness becomes one of its symptoms. We know of no reason why syphilitic exudation in the middle ear any more than a catarrhal one should cause a sudden and absolute deafness. The pressure from a non-specific hyperæmia, catarrh, or thickening will be the same as that from a specific one. It is the situation of the lesion,

* *Medical Record*, from *Centralblatt für Chirurgie*, August 19, (77 ?), from Virchow's Archives.

† *Lehrbuch*, p. 617.

and not its character that determines the amount of deafness. When we know that deafness must be very rarely absolute, unless the central organ be involved, just as we know that blindness can be very rarely absolute, unless the retina and optic nerve are affected, have we not a fair right to conclude that absolute deafness depends upon some lesion of the labyrinth or auditory nerve? In passing, we may call attention to the peculiar nomenclature of the paper under discussion. The author speaks of a (*non-purulent*) *mucous catarrhal inflammation of the middle ear*, by which is meant a catarrhal inflammation.

Now let us turn to the cases which are presented to prove that the sudden deafness of syphilis, is dependent upon disease of the middle ear. In case 1, a man of 42 is admitted to St. Francis Hospital, having had syphilis ten years before. He is weak and dizzy and staggers from side to side, and he has pains over his whole head. He has also facial paralysis on the left side. There is no record of any impairment of hearing for nearly three months, and then "deafness became a feature in both ears," whether suddenly or not, we are not told. Certainly all the evidence thus far makes it more likely that a disease extended from his brain to his labyrinth, than from his auditory canal to his drum-heads. He had had plenty of meningeal symptoms. The deafness is nearly absolute, for it is stated that he cannot hear shouting. The physicians at St. Francis Hospital thought the patient had a brain tumor, and I think our readers will agree that he had some kind of brain disease. He now comes under the care of the N. Y. Ear Dispensary, seven months after his admission to St. Francis Hospital. He still has facial paralysis, the uvula is drawn to the right side, and he still staggers. His drum-heads show nothing at all marked, he does not hear the tuning-fork well, not at all on the forehead; he is placed on mercurial treatment, his drum-head is perforated, no fluid is found, and he is finally discharged. Two months afterward he is a little better as to his walking, but no better as to his hearing. This case is gravely reported as one of sudden deafness, dependent upon disease of the middle ear. The present writer can find no proof of what is claimed in the narrative of the case. What evidence there is leans very strongly in his mind towards disease of the labyrinth.

The second case is that of a man of 21, who had syphilis six months before, and woke up five months after the primary sore, with the discovery that he was very deaf. In a few days he could

hear nothing. Later he had great pain in the back of the head which lasted for three weeks, during which time he was dizzy, and he had also dimness of vision. He perhaps hears some sounds in the right ear through a trumpet. The tuning-fork is heard when placed on the bones. Exhaustion of the air from both auditory canals, enables him to hear some words through a speaking-tube. He is put upon an active mercurial course. About three months after he passes from observation. His drum-heads, which were retracted and somewhat opaque, are said to be clearing. He cannot hear any words distinctly, however loudly shouted. Dr. Sexton evidently relies upon the fact that the hearing was very slightly improved at one time by rarefaction and condensation of the air in the external meatus, together with the changes in the drum-heads as proofs that the trouble was entirely in the middle ear.

The present writer prefers to believe that a deafness coming on suddenly, and attended by dizziness and staggering gait as well as frontal headache, is much more likely to have depended upon a lesion of the labyrinth, especially since as seen by the doctor's own notes, all the treatment of a mechanical nature directed toward the middle ear had no effect whatever. Now, if mechanical and structural changes in the tympanic cavity cause all these symptoms of central disease, is it not strange that local and mechanical treatment does so little for their cure. We are told that he was put upon an "active mercurial course." If this means what I fear it does not, that this patient received a thorough inunction treatment, together with iodide of potassium in increasing doses as delineated in my published cases, I would be satisfied that the patient had had every chance of recovery. In my opinion no patient with the symptoms that this one presented, would have been thoroughly treated with such prescriptions as are found recorded in the other cases used to illustrate this article. A lesion of the labyrinth is usually, I think, one of the later manifestations of syphilis. As such it will require a very prompt and energetic treatment to arrest it. Besides, the parts involved are so vital that delay in treatment, or inadequate doses of mercury and potash will allow the disease to go on unchecked until it has caused irreparable damage. And I think it probable, that the diseases of the peripheric parts of the body are not only of themselves apt to run their course with more rapidity, but also to be more quickly influenced by treatment than lesions of the brain

and the labyrinth. What this may depend upon, if it be a fact, I cannot say. One of the proofs to my mind of the existence of a lesion of the labyrinth, is the fact that such symptoms as these delineated in Case 2, are only relieved by the most active and persistent "mixed" treatment.

The third case of "sudden deafness," reported in the paper under discussion, is one in which the patient stated that her deafness "came on by degrees, in rather a brief period of time." It was certainly a syphilitic case. She had attacks of dizziness; and she could not hear her own voice always when talking, and she is unable to regulate the pitch. These latter symptoms are those which Dr. Sexton in a previous paper has laid great stress upon as evidence of peripheric trouble, and I am quite willing to concede that they show disease probably of the Eustachian tube, and about the fenestra ovalis. But, this by no means excludes much more important changes in the deeper parts. One drum-head was punctured without any effect, except to increase the noises for a short time. She is put upon iodide of potassium, four gr. every four hours, and in three days she is less dizzy, and can hear her own voice most of the time. The patient then disappears from observation for six months, during which time she is said to have been treated for cerebral syphilis. She had several epileptiform seizures, and she took iodide of potassium in large doses. The hearing power scarcely underwent any change, and here the case ends. Certainly there is a strong suspicion that the blood-vessels of the brain were involved in this case, witness the epilepsy, and if those of the brain, why not of the labyrinth. This is, I think, not a clear case of "sudden deafness" from disease of the middle ear alone.

The fourth and last case quoted may be epitomized as follows: A man of 21 lost the hearing of one ear suddenly and absolutely with vomiting and dizziness. Iodide of potassium was given. Two years after, he lost the hearing of the other ear with the same symptoms and then Dr. Sexton saw him. He was anæmic, and had so much vertigo that he was attended when he was on the street. He had severe frontal headache, the pain extending to the vertex. He does not admit having had syphilis, and no positive evidence on that point is presented. There were evidences of sub-acute inflammation of the lower ends of the canals. He heard his own voice distinctly, but the distinctness varies. He does not hear an outside voice at all. The bone conduction is increased

by closing the canals. Very low tones uttered close to his ears are painful. He hears all the notes of a piano up to middle C, after that he only distinguishes a rumbling sound. If this be not a symptom of disease of one part of the labyrinth, then our notions of the physiology of the organ of Corti must be revised. How often all of us have seen patients whose labyrinths have probably been ruined by cerebro-spinal meningitis, only able to hear the low notes of the piano. We have always supposed that they heard these, because the auditory nerve with its feeble powers was only able to perceive notes made up of very few and slow vibrations. There is no proof that this case was syphilitic, but we are willing to believe with Dr. Sexton that it probably was. It certainly was a sudden case, and its very suddenness is one of the arguments to prove that it is really one of disease of the labyrinth. Certain it is, that when labyrinth disease does occur, it is with just such symptoms as these. We can hardly imagine a man becoming suddenly and absolutely blind on account of an opacity of the cornea or lens, but how often does a hemorrhage into the sheath of the optic nerve, a plug in the central artery, or an exudation in the macula, destroy all but a glimmer of what we call sight. Just so in my opinion, it is hard to believe that sudden and absolute deafness attended by vertigo and vomiting, can depend on anything less than an exudation, hemorrhage, embolus or tumor, pressing upon some part of the auditory nerve. That other parts are soon involved, or at least, may soon become involved in such a morbid process, I should never think of denying. But, that peripheric disturbances alone can produce such a combination of symptoms I am not able to admit.

Having reviewed the histories of Dr. Sexton's cases I will pass on to the remarks and conclusions that follow them. The throat symptoms are admitted not to have been prominent "nor were the Eustachian tubes found to be obstructed in any of them."

The writer then goes on to remark that he inclines to the opinion that syphilitic lesions seldom if ever reach the middle ear from the throat. This is a view I cannot share. Both in children and in adults, in congenital and acquired syphilis, have I seen cases in which the hyperæmia and catarrh of the pharynx extended to the middle ear, and why should not a syphilitic catarrh as well as a non-syphilitic one creep up through the Eustachian tubes to the middle ear? Has syphilis such peculiar methods of extension that its inflammatory products pass around the ordinary

channels to attack adjacent organs by a circuitous course? Dr. Sexton's argument seems to be that the tympanic cavity is not only the favorite and almost exclusive situation for syphilitic lesions of the ear, but that they reach this part through the drum head and auditory canal. If this be true, then the affections caused by syphilis are certainly unique.

Dr. Sexton also states that "we know of no cause which produces such peculiar and decided symptoms of deafness" as syphilis. If, by this extraordinary phrase "symptoms of deafness," vertigo and staggering gait are meant, I think that he is in error, for there are a number of causes, for instance the exudation occurring in the course of cerebro-spinal meningitis, mumps, and hemorrhages which produce symptoms very like those of the cases narrated here. It has long since been shown that even syphilitic iritis has no pathognomonic symptoms, and I have yet to learn that we can determine the specific cause of an attack of sudden deafness, by the symptoms, unattended by a history. Considerable stress is laid upon the discovery that in these cases there is a "pre-existing state of hyperæmia in the drums either from cold, or from a sympathetic irritation associated with some affection of the mouth or throat." If I understand this language, it is a direct contradiction of what Dr. Sexton has already said, in regard to the non-extension of syphilitic aural disease from the mouth and throat to the drums. For what is an inflammation of the drums caused by cold, or a sympathetic irritation associated with an affection of the mouth or throat, but an inflammation extending to the drums by the usual channels from the usual causes? Our author gives away, I think, a part of his case when he makes this admission, for he has just been claiming that the throat symptoms were not prominent, and he has tried to show that the drums were reached through the auditory canal.

We pass over the account of the pathology of syphilitic inflammation of the tympanum, for, while it is probably correct, it is open to the same criticism that has been so often made in regard to lesions of the labyrinth, that is, it is purely theoretical, and not founded on any post-mortem examination.

If Dr. Sexton will not allow those of us who believe from the subjective and objective symptoms, that there is a disease of the labyrinth, even if we are not able always to verify our opinion by an examination on the cadaver, neither can he be permitted

to base an argument upon a theory that there is an exudation limited to the conductive apparatus, or as he would have us believe, mainly or, perhaps, wholly in the malleo-incudal joint. We are less willing to do this, since the lesion upon which Dr. Sexton lays so much stress, is one as yet scarcely found by the pathological anatomists. A study of Toynbee's catalogue will furnish the evidence upon this point.

Continuing his argument, Dr. Sexton thinks that the labyrinth in these cases is not greatly involved because the auditory nerve responds fully to the sounds conveyed to it, whether from the patient's own vocal cords or a vibrating tuning-fork placed on the skull. Let us see how the histories of his cases justify the use of the adverb "*fully*." In the first case, the tuning-fork placed on the teeth is heard best in the right ear, but when it is placed on the vertex and glabella it is not heard at all. Can it be possible, that the doctor considers this a full response to the sounds conveyed to the auditory nerve? There is no account as to how the patient hears his own voice, so no argument can be based upon this case. Now, I think that, if this man had had an affection which was even predominantly one of the middle ear, that is to say if the labyrinth was sound or slightly affected, the vibrations of the tuning-fork would have been heard on any part of the skull, and that its sound would have seemed to him to be very loud; in other words, it would have been intensified. If experience is worth anything upon this subject, it shows that it is especially in affections of the labyrinth that the tuning-fork is not heard at all on some parts of the skull, while in those of the middle ear alone its sound is always intensified.

Then again, in his first case "the patient cannot hear any voice, however loud,"—this is Dr. Sexton's own statement,—"*not even shouting*." To repeat my argument in a previous part of this paper, I again state that it is very hard, with the knowledge we now have, to believe, that any rigidity of the ossicles, any hyperæmia of the membrane of the middle ear, any amount of fluid in the tympanic cavity, any stricture of the Eustachian tube, or any combination of these conditions, would make a man so deaf that he could not hear any voice, however loud. I appeal to the judgment of those who have seen much aural disease, whether in their opinion anything but a central affection can cause impairment of hearing to such an extent as this? The analogies that I have already frequently used with regard to the affections of the

external portions of the eye, as compared with those of the optic nerve and retina, in causing blindness, may be again recalled.

In Case 2, we find that "words shouted through a trumpet into the left ear are unheard," but the patient fancies that he can hear some sounds when the experiment is made in the right ear. "The tuning-fork is heard when placed on the cranial bones." There is no evidence furnished that he heard it fully, or as middle ear cases usually do, intensified.

Rarefaction of the air causes the second patient to hear some words through a speaking tube. This is one of the points upon which the author relies for his argument, of which I shall speak more fully subsequently, that the middle ear is chiefly affected when in any case, change in the density of the air in the external auditory canal alters the hearing power. On being dismissed from treatment, it is said that "he hears the tuning-fork as before, but he cannot hear words distinctly however loudly shouted through a trumpet." This case, from this part of the evidence, seems to have been a mixed one; that is, one in which there was considerable affection both of the middle and internal ears; but if we do not abandon our notions of naming diseases from the part chiefly affected, we should still class this as predominantly one of the labyrinth.

I have never believed that the affection, which I have denominated cochlitis, involved the cochlea solely, but that it affected that part of the ear predominantly, just as a patient may have severe hyperæmia, and even inflammation of the external auditory canal, quite secondary to the main trouble in the middle ear.

It would be very convenient indeed, if we could separate diseased parts from each other by a line as distinct as that in facial erysipelas, or, to use a geographical comparison, as marked as the separation of Mexico from the United States by the Rio Grande; but the present writer inclines to the view that to give the exact line of demarcation in disease, is very often impossible.

In the third of Dr. Sexton's cases, the patient was absolutely deaf to all external vocal sounds, but she hears her own voice in talking. Yet, sometimes, even that becomes inaudible. "To-day," quoting Dr. Sexton's words, "she could not hear herself scream." "She hears some letters of the alphabet better than others." When dismissed from treatment, "she hears her own voice in the natural tone." "She hears herself sing, but cannot hear herself whistle." "A vibrating tuning-fork is heard when

placed on the teeth and mastoid, but is *not* heard when placed on the vertex." She is absolutely deaf as to the voice of others." Here again the tuning-fork is not fully heard. I can only repeat with reference to this case what I have said with reference to the first, that so far as the power of hearing the tuning-fork and the voice shows anything, it indicates, unmistakably in my opinion, disease of the auditory nerve in some part of its course.

In the fourth case, the patient "hears his own voice distinctly, but the distinctness varies, frequently, for a few moments at a time. He hears absolutely no voice in the left ear, but in the right he hears sound when a metallic bougie is struck on the tuning-fork near his ear." A little while before dismissal it was noted that he could "hear all the notes on a piano up to middle C, but above that letter he can only distinguish a rumbling sound." This fact, it seems to me, indicates that the portion of the labyrinth tuned to high notes was more affected than that tuned to lower notes. When he was dismissed from treatment he could not hear any conversation, even through a trumpet. "Very low tones uttered close to his ear were painful." This symptom of pain from *sound* was long since stated by myself to be, perhaps, an evidence taken with other symptoms, of disease of the labyrinth, and I believe it will be found that only those persons who give evidence of hyperæmia or inflammation of the labyrinth, either primary or secondary, are effected by sounds to any unpleasant degree.

The doctor then proceeds to remark that mobility of the drum-head, pathological changes in the ossicles, especially in the malleo-incudal and the stapeo-incudal joint, or fixation of the stapes in the oval window, are sufficient to account for all the phenomena of audition as described in the four cases which I have just cited. I have already expressed my own opinion, namely, that any or all of these changes are not sufficient to produce absolute deafness, to produce inability to hear certain tones at all, or to cause pain to be experienced when sound is conveyed to the ear. He then remarks, after having entitled his paper, "*The Sudden Deafness of Syphilis*," and having given four cases to illustrate it, two of which are not sudden at all, that the deafness in these cases is not always sudden; that is to say, it does not always occur suddenly. He then refers for proof of his view, that the changes in the middle ear are sufficient to account for all the symptoms, to a paper

published by him in the Transactions of the Otological Society for 1878.

It is to be expected that the majority of the readers of these *Archives* are familiar with this elaborate paper by Dr. Sexton, but since it has been alluded to in this argument, I am obliged to follow him there and to discuss the points which it contains.

As was stated in the beginning of this review, Dr. Sexton's article in *Hays' Journal* is apparently a sequel to the one published in the Transactions of the Otological Society. The latter is an argument in favor of the conducting as against the perceptive parts of the ear as being the seat of the phenomena of audition and disease, but it contains very few proofs for the correctness of the views advanced.

These are supposed to be found in the narration of the cases of the former paper. I am obliged to select merely those points that bear directly on the question under consideration.

Great stress is laid upon the fact that the membrana tympani is capable of transmitting from 16 to 40,000 vibrations a second to the auditory nerve, and upon the opinion of Edward Weber that the bones of the ear, and the petrous bone, are solid incompressible bodies, and that the fluid of the labyrinth is likewise incompressible, also that the ossicles must be regarded as solid levers which transmit waves of condensation and rarefaction to the fluid of the labyrinth moving it as a whole.

It is argued that because in health there is a very free motion or separation in the joint between the malleus and the incus, when disease has increased the separation, symptoms such as autophony and tinnitus may occur.

The separation of the joints is supposed to result from hyperæmia or inflammation of the drum or pathological changes in the ossicles. Then follows a discussion of double-hearing, so-called. Under autophony Dr. Sexton seems to include double-hearing; not hearing one's own voice naturally, hearing one's own voice as if at a distance down in a well or pit, all of which are referred to affections of the middle ear. It is stated that autophony does not occur when the membrana tympani is absent. It is stated that hearing the ticking of a watch and not hearing ordinary conversation, and the contrary, hearing better in a noise, are explainable by the condition of the malleo-incudal joint or drum-head or both, but no proof is given for this statement. I think I have shown that no adequate explanation has ever

been given for the phenomenon of hearing better in the midst of noise.*

It is also stated that the effect produced by inhaling chloroform, ether, nitrite of amyl, or by taking large doses of quinine, is hyperæmia of the ear, and consequently temporary separation of the malleo-incudal joint. It is difficult for me to entertain such an explanation as this. That a man may take a dose of quinine, or inhale chloroform or ether or nitrite of amyl, and thereby separate his malleo-incudal joints by hyperæmia, and not at all affect the labyrinth is to me simply incredible.

But Dr. Sexton seems desirous to exclude the labyrinth from having anything whatever to do with hearing, except in a state of health. Even in disease artificially produced, the labyrinth he seems to believe, is isolated from all its surroundings, and enjoys an immunity that is not shown by any other part of the human body.

It is argued that tinnitus cannot probably have its origin in the incompressible cavity of the inner ear, but it is admitted that a sudden increase of blood in the labyrinth can force the stirrup from its close connection with the other ossicles, and that the return will be attended with sound, and in this way we may account, it is said, for the whistling and whirr of labyrinthine vertigo. In other words, the ossicles must still be held to account for an affection which, according to the writer's own statement, begins as a sudden increase of blood in the labyrinth. Thus having said in one breath, that tinnitus cannot have its origin in the labyrinth, in the next, it is stated that the sudden increase of blood in the labyrinth forces the stirrup outward and the return causes a noise; *ergo*, the origin was not in the labyrinth.

But we are unable to follow Dr. Sexton through his arguments to prove what seems to be his belief, that almost all the symptoms that are seen in diseased ears, from sudden and absolute deafness to vertigo and tinnitus, are chiefly due to abnormality in the conducting mechanism and especially to "separation of the malleo-incudal joint." They are, as it seems to the present writer, of the kind already quoted.

It should be said, before passing on to a review of Dr. Sexton's conclusions, that one of the four cases, No. 4, which he has presented as proofs that the sudden deafness of syphilis is due to an affection of the middle ear, was published by Dr. Buck in his

* Treatise on the Ear, p. 512.

paper, he having seen the case in consultation, as one of disease of the labyrinth.*

In classifying these cases Dr. Buck says, "To the *second class*, finally, belong the following seven cases, in all of which it is fair to assume, from the comparatively normal condition of the middle ear and from the history of the case, that the labyrinth or its immediate vicinity was the seat of the pathological changes that caused the deafness." Although I would not attempt to argue from the weight of authority, for this difference of opinion cannot be settled by any reference to the names of those who advocate one view or the other, I cannot refrain from quoting Dr. Buck's words to show, that Dr. Sexton failed to convince the gentleman whom he called in consultation, that his theories were correct.

We now continue our review of the paper published in the *Journal of Medical Sciences*. Dr. Sexton states that the results already obtained do not warrant a favorable prognosis in the cases of sudden deafness arising from syphilis, and that the chances of success are not good, because the lesion is not ushered in with pain in the ear.

It seems to me, that a lesion which is ushered in by sudden and profound deafness, vertigo and great tinnitus is sufficiently alarming without pain, to invite an early consideration. We find no record in the cases given of the energetic mixed treatment advised, not as Dr. Sexton intimates, "by Wilde and later by Roosa," but advised first by Roosa and never by Wilde, so that we cannot say that the author would not modify his own prognosis, if he would resort to the treatment under which my own cases were benefited.

I will now present the conclusions reached by Dr. Sexton, and discuss them *seriatim*.

CONCLUSIONS. 1. "Syphilitic affections of the ear inducing sudden deafness are of exceptional occurrence."

I make no objection to this conclusion; fortunately they are of exceptional occurrence.

2. "They would seem to be induced by a pre-existing hyperæmia in the ears, excited by sympathetic relationship, or by an inter-current attack of aural mucous catarrh." †

I confess I do not quite understand the point here: How a

* *American Journal of Otology*, vol. i, no. 1.

† According to the ordinary lexicographers, *catarrh* is a discharge from, or an inflammation of, a mucous membrane. To use the term mucous catarrh is certainly not to increase the simplicity or correctness of aural nomenclature.

"pre-existing hyperæmia" is excited by a "sympathetic relationship," (a sympathetic relation between what?) I do not know. If this means that a person having syphilis, is more liable to a sudden deafness if he has previously suffered from a hyperæmia of the ear or from nasal catarrh, I think none of us will deny it, but as the conclusion stands I have failed to find it intelligible.

3. "The attacks are characterized by their sudden occurrence, and both ears are usually affected simultaneously, although the contrary sometimes takes place."

My experience has led me to believe that in a certain class of cases, those affecting the labyrinth, the attacks of deafness are sudden, but I have seen other cases of affection of the ear, which seemed to me to be caused or modified by syphilis, where the impairment of hearing came on gradually. As I have already said, in one of Dr. Sexton's four cases the deafness cannot be said to have come on suddenly, and in several of Dr. Buck's cases * the same is true.

4. "The deafness is always very great."

With regard to this I have only to say, that when the deafness is so great as to be nearly or quite absolute with regard to the human voice, I should conclude that there was a primary or secondary lesion of the perceptive apparatus, whatever may have happened to the conducting mechanism.

5. "This syphilitic affection speedily causes a disarrangement of the integrity of the chain of ossicles, most likely at the malleo-incudal joint, probably in some instances of the stapedo-incudal joint, or both of these. The movements of the stapes in the oval window are also likely to be interfered with. The two first mentioned conditions serve to explain the noises in the ears, and the autophony; the last mentioned condition would increase the anomalies of hearing."

This has been fully discussed in going over the subject. It seems to me not to have been proven, but to rest on assertions which even the author's selected cases do not at all substantiate.

6. "The disease is usually unattended by pain in the ears, it is non-purulent, and its incurability is a characteristic."

The affection causing the sudden deafness of syphilis is certainly usually painless. It is also non-purulent. But I cannot admit, if it

*1. c.

be thoroughly treated, at an early period, that its incurability is a characteristic.

7. "The affection does not depend, so far as we know, on anomalies of any portion of the labyrinth, although the latter of course is liable to invasions from syphilis with the nature of which we are as yet unfamiliar."

So far as we know, the *sudden* deafness of syphilis, as shown by clinical and pathological investigations, does depend upon disease of the labyrinth. At least the evidence for the truth of this theory, is much stronger in my opinion, than for the one that it depends upon lesions of the middle ear, or especially upon an affection of the malleo-incudal joint.

If the reader will bear with me a short time longer, I will now tabulate the conclusions which I have reached regarding sudden deafness caused by syphilis and other affections, which I do not think have as yet been overthrown.

It is hardly necessary to say, that I am far from believing that these conclusions are absolutely correct and final. Undoubtedly, whatever may have been done as yet in that way, better knowledge will some day modify them.

1. Very great impairment of hearing, occurring suddenly, and not to be explained by the conditions found in the auditory canal or middle ear, so far as we can examine them, and not relieved at once, by mechanical treatment, whether occurring in the course of syphilis or not, probably depends upon a lesion in the labyrinth or auditory nerve.

2. Absolute or nearly absolute deafness, the inability to hear certain tones, are symptoms of either primary or secondary lesion of the labyrinth.

3. If the tuning-fork be heard very feebly or not at all when placed upon the skull, or if it is heard better through the air than when placed upon the bones, it is probable that there is disease of the labyrinth.

4. Syphilitic diseases of the labyrinth, if vigorously attacked by means of mercury and the iodide of potassium soon after the beginning of the disease, may often be alleviated and sometimes cured.

5. Pathological examinations of the labyrinth although not numerous, have already demonstrated that changes may occur there, which confirm the conclusions that have been formed from clinical investigation.

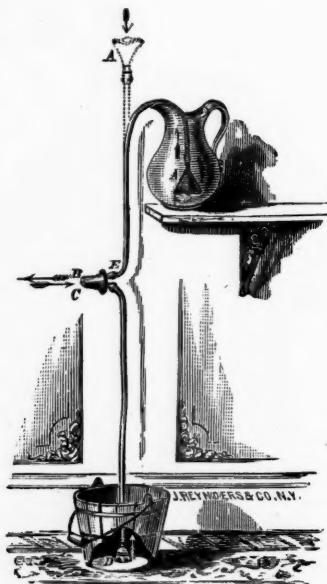
A NEW AURAL DOUCHE.

DURING the past summer Dr. Charles Fayette Taylor, of New York, suffered for a time from an acute suppuration of the middle ear, and found great relief from the use of warm water by means of the *fountain syringe*. His remarkably inventive mind soon turned his attention to the defects in this method of applying water to the ear for the relief of *pain*, and he invented the *douche*, of which a figure and description are here given. I cordially commend it to my professional brethren as a valuable means of applying warm water to the auditory canal, drum-head, and tympanic cavity. It is not useful as a *syringe*, but as a *douche*. I think it better in most cases than the fountain syringe. It may be obtained of Messrs. John Reynders & Co., 303 Fourth Avenue, New York.

The Fayette Aural Douche consists of two siphons, so arranged that the flow starts at the same moment in each; and while one siphon conveys the water into the ear the other lifts it gently out, without friction or pressure upon the inflamed tissues.

In the figure, *BC* represents the *ear-piece*, which is made of suitable size and shape. Two holes are bored through it, one lying above the other when it is in its proper position. On each of the two projections at the larger end, a piece of flexible rubber tubing (such as is used for nursing-bottles) about four feet long, is fitted. At the small end of the ear-piece the division between the holes is cut back about one-eighth of an inch, so that placing the finger over this end leaves one continuous passage from the top, *A*, to the bottom, *D*. With the finger over the small end of the ear-piece, as just described, when water is poured into the funnel *A* it will flow directly through both tubes, and come out at the lower end, *D*, in the drip-vessel. When all the air has thus been excluded and a current established, the funnel *A* is dropped into

the basin or pitcher which serves as a reservoir, and a single siphon is formed. The rubber tubes are now compressed by the thumb and finger at *E*, so as to arrest the flow, the finger is removed from the end *BC*, and the ear-piece is inserted into the



auditory canal: then letting go the tubes at *E*, a *double* siphon is instantly established, *AB* conveying the water into the ear, and *CD* carrying it out by atmospheric pressure. Thus the resistance and pressure, often painful, of the in-coming and out-going currents is avoided, and a small amount of constantly changing water, of any desired temperature, is kept in contact with the auditory canal and drumhead. Any amount of water desired can be used in one continuous bath, without the trouble of refilling the reservoir several times, as is so often required in using the fountain syringe.

[D. B. ST. J. R.]

OBJECTIVE AURAL SOUNDS PRODUCED BY VOLUNTARY CONTRACTION OF THE TUBAL MUSCLES.

BY SWAN M. BURNETT, M.D., OF WASHINGTON, D.C.

MR. A. P. L., 44 years of age, has possessed the power of producing a certain sound referable to the ears since his early childhood. He was not aware of such a power being unusual, until he called my attention to it accidentally some weeks ago, when under my care for some trouble in the right ear. The sound is produced by a voluntary muscular contraction in the throat. He says it appears to start from this region, and travel outward through the ears.

The sound, which is a fine mucous râle, and similar to the rubbing of the thumb and finger nails obliquely across each other, as suggested by Dr. Holmes in his paper in the last number of these ARCHIVES, can be heard in the *R.* ear at a distance of 50 *cm.*, and is clearest, I think, just on a line with the meatus. It is not heard on the left side at quite so great a distance. It can also be heard in front of the open mouth, also at about 50 *cm.* For the past few weeks he has been performing, under my direction, the experiment of Valsalva, and he finds that when he makes this muscular contraction in his throat at the time of forcible expiration, the air enters the drum cavity with much greater readiness. In fact, he has become able to force a small stream of air into the middle ear of the right side, by simply closing his mouth and making an expiratory effort at the same time that he produces the contraction in his throat. On the other hand, when the middle ear is filled with air, by making the contraction, it passes out into the throat. The contraction takes place on both sides simultaneously as a rule, though, occasionally, it appears on

one side a little in advance of the other. He has not the power to produce it on each side separately.

I watched the M.T.T. during the movement, and could not notice that the position of the malleus was in the least altered. I therefore infer that the tensor tympani does not participate in the contraction.

My friend, Dr. F. Hyatt, an expert laryngoscopist, was kind enough to examine for me the pharynx during these contractive movements. I also myself saw the movements in the larygoscopic mirror with great distinctness.

During the contraction the anterior wall of the pharyngeal orifice of the tube remains perfectly stationary, while the posterior lip is moved obliquely forward and upward across the mouth of the tube, the edge sometimes reaching to the anterior border, completely closing it, but usually going only about two-thirds of the distance across. The uvula is, at the same time, drawn upward. In a large number of observations, carried through several days, these movements never varied in their character. The mouth of the tube was in a perfectly normal condition. It may also be stated that this gentleman possesses the power of contracting his aural muscles, particularly the *retrahens aurem*.

This case is instructive, in the first place, in that it shows that the objective aural sounds are not produced by a contraction of the tensor tympani, as was supposed by Dr. Holmes. The movement of the M. T. observed in his case, can be accounted for, I think, by the thinness of the membrane which allowed it to be easily affected by the alteration in density of the air in the drum cavity which is the natural result of the suction movement produced by the contraction.

I think the sound is caused by a separation of the moist surfaces of the mouth of the tube after they have been brought together by the contraction of the levator palati. This sound is carried by the substance of the tube, or the air contained in it, to the terminal expansion of the auditory nerve by way of the drum, and is thence projected outward.* The great value of the observation, however, lies in the

* During the act of swallowing, if one will observe, a sort of crackling noise will be heard in the ears. This is, in my opinion, produced by the same cause as the sounds heard in this case, namely, by the separation of the lips of the mouth of the tube.

light which it throws on the action of the muscles of the Eustachian tube.

It has always been supposed that the action of the levator palati was to draw the floor of the tube upward, the mouth being thus shortened and widened. The tensor palati, acting at the same time, was thought to separate the walls of the tube and thus open the way from the pharynx to the cavity of the drum.

Our observation seems to negative this view altogether. During the contraction of the levator palati there is no shortening and widening of the tubal aperture, but on the contrary a closure more or less complete of the pharyngeal orifice, and even after the relaxation of the muscle there is no observable opening of the tube due to the contraction of the tensor palati. These observations are very similar to those made by Lucaë and reported by him in recent numbers of Virchow's Archives, on some persons in whom the nasal cartilages had been destroyed by lupus, leaving the pharyngeal orifices of the tubes exposed to view during deglutition and phonation. He thinks that if the tube is opened at all it is by an internal dilatation simultaneous with closure of the external orifice, due to simple mechanical inflation or action of the tensor palati.

In our case we have, in all probability, the same action of the tubal muscles as in the act of deglutition, since the contraction very much facilitates the entrance and exit of air from the cavity of the tympanum.

Therefore, while it is now demonstrated that the mouth of the Eustachian tube is not opened, but closed by the action of the levator palati, the question of how it *is* opened, if *at all*, is not clearly shown. It is evident, however, that the permeability of the tube is increased, and the most plausible explanation is that of Lucaë given above. The emptying of the tympanum of air by swallowing I would consider satisfactorily explained on the principle of suction, the separation of the lips of the tube being affected in such a manner as to draw the air from the drum cavity down into the throat.

September 25, 1879.

REPORT ON THE PROCEEDINGS OF THE
BRITISH MEDICAL ASSOCIATION,
HELD AT CORK, AUGUST, 1879.

(Being an abstract of the Report published in the *British Medical Journal*,
August, 30, 1879.)

BY DR. F. P. CAPRON, OF YONKERS, N. Y.

Wednesday, August 6th.

THE conference was opened by Dr. Cassells (Glasgow), who, after a few remarks concerning the fact that to-day, for the first time, otology has received a distinct recognition in the proceedings of any medical congress in this country, proposed that Dr. Laurence Turnbull, of Philadelphia, be requested to preside over the meeting. The proposition was seconded and unanimously carried. Dr. Turnbull then took the chair, and, after a few complimentary remarks, introduced the business of the day.

On the Production of Artificial Deafness, being an Experiment in Physiological Acoustics, and its bearing on the Etiology and Evolution of Diseases of the Ear. By J. PATTERSON CASSELLS, M.D. (Glasgow). The experiments of Valsalva and Massiat were employed to show that a disturbance in the tympanic tension causes not only defect of function but also tissue-changes. These experiments seemed to bear out the following theory of the etiology and evolution of ear-diseases. 1. A certain degree of tympanic tension is essential to perfect function, that is, perfect hearing. 2. The essential cause of all the affections of the organ of hearing is a disturbance of the normal tympanic tension. 3. All the pathological phenomena of the diseases of the ear evolve themselves with regular frequency.

Throat-deafness associated with Paresis of the Palato-tubal Muscles. By E. WOAKES, M.D. (London). This paper treated of a

form of deafness due to a loss of power—paresis—of the intrinsic muscles of the ear, the clue to which is furnished in a co-existent paresis of the muscles of the Eustachian tube and palate. The latter condition, which is readily observed, affords the clue to the existence of the former; the correctness of the diagnosis being established by the identity of the sources of the nerve-supply of the muscles proper to the ear, and of those of the tube and palate. The symptoms whereby this form of deafness may be diagnosed from other ear affections were detailed, and the paper concluded with an illustrative case, in which the proper remedial measures were given.

Dr. Weber-Liel (Berlin) agreed with Dr. Woake's observations.

Mr. Lennox Browne (London) considered the catarrhal element very important in the cases mentioned, and expressed a preference for Politzer's inflation over that of the pneumatic tractor.

Dr. McKeown (Belfast) referred to the comparatively few cases in which the nervous element was present.

Dr. Woakes, in reply, remarked that Politzer's inflation was used with the catheter, and that the power of the tractor could be regulated. He did not maintain that all cases of tubal deafness were due to paresis, but that there were some, the result of vaso-motor influences.

The Therapeutic Value of Intratympanic Injections of medicated Fluids in the Catarrhal Affections of the Middle Ear.

A discussion on this subject was opened by Dr. J. Patterson Cassells (Glasgow). In his earlier practice as a specialist he had for many years employed the injection of medicated solutions in the treatment of the diseased tissues of the middle ear, but of late years, having become satisfied of the inutility of such solutions aside from the air contained in them, or injected along with them, he had abandoned their use. He thought it impossible to break up adhesions, dissolve mucus, and restore the mobility of the tissues of the ear by medicated solutions of zinc, copper, chloral, etc., while these tissues themselves, and the mucus contained in the tympanum, outside of the body, were found wholly insoluble in such solutions as liquor potassæ, absolute alcohol, etc. Dr. Cassells considered that the discussion ought to be one of chronic non-suppurative catarrhal affections of the middle ear; and that the value of the act of inflation should be considered apart from

the action of the medicated fluid. He asked that those giving their opinions should see that such were supported by facts in their own experience.

Intratympanic Injections. By Dr. WEBER-LIEL (Berlin). The author had come to the conclusion that it is impossible to cure inveterate catarrh of the tympanic cavity by means of the intratympanic injection of medicated fluids. The symptoms of catarrh of the tympanum may depend upon, (a) Extension of a simple catarrh from the Eustachian tube and pharyngo-nasal cavity; (b) not only upon a catarrh of the tube, but also upon a collapse of the walls of the Eustachian canal, due to insufficient or paralyzed action of the muscles of the Eustachian tube; (c) upon alterations of the vaso-motor and trophic nerves, and of the sympathetic supplying the tympanic cavity. In each of the three cases mentioned the cause or causes demand treatment. Thus, for the first, injections of strong solutions of nitrate of silver into the mouth of the Eustachian tube, followed four days later by the use of the air-douche. A few drops only of the solution are to be used, and the patient must not blow his nose till four hours after the injection.

In the second set of cases electricity, intratubal, is recommended. For the third class, carbonate of soda may be used to soften false bands of tissue and intratympanic adhesions, also to diminish mucus and incrustated matter. In this last class intratympanic injections had been found to give good results. The injections, combined with air-pressure, were effected by means of his pharmaco-koniantron.

The Treatment of Non-Suppurative Hypertrophic Catarrh of the Middle Ear. By LENNOX BROWNE, F.R.C.Ed. (London). Mr. Browne maintained that the use of intratympanic injections is much less extensive than formerly, and showed objections to the practice on anatomical, physiological, and practical grounds.

From an anatomical standpoint he claimed that the practice is injurious since, to send the fluid as drops or spray, it is necessary to pass the instrument into the tympanum. But great force may accomplish the same, yet each is attended with great danger. Also, from the anatomical relations of the tympanum, cerebral inflammation, jugular phlebitis, etc., may arise, if acute catarrh be produced. On physiological grounds he objected because the tympanum is an air-cavity, and will not endure the presence of

a fluid. In his own practice Mr. Browne claimed no beneficial results, but, on the contrary, had often seen alarming inflammation thus produced. If to be employed at all, he would limit the use of injections to suppurative cases with a perforate membrane, or, at the time of making the injection, he would perforate the membrane. The speaker concluded by stating that he doubted if such cases are ever cured, but thought that their condition might be greatly improved by means of inhalations, Valsalvan, Politzer, and cathartic inflations, with pure air or medicated vapors, by use of the post-nasal douche, by faradisation, by means of the exhausting speculum, and, lastly, by careful attention to the constitutional diathesis.

Dr. Cassells disapproved of the treatment because he did not get good results. He had injected salt through perforate membranes, and was successful in removing the mucus.

Dr. Kirk Duncanson (Edinburgh) asked how Dr. Cassells removed all the fluid. In his practice he had noticed that only a small portion of the fluid injected by the Eustachian tube came out through the perforated membrane.

Dr. Cassells replied that he thought a large portion of the fluid went down the throat.

Dr. Duncanson thought some of the fluid remained in the tympanum, its floor being below that of the meatus.

Dr. Pierce (Manchester) thought medicated injections no improvement over medicated air.

On the Treatment of Relaxed Membrana Tympani. By W. A. McKEOWN, M.D. (Belfast). Dr. McKeown stated that almost all the evils resulting from affections of the tympanum arise from a drawing or pushing in of the membrana tympani. The primary consideration of the treatment should be to prevent this, which can be done by means of some agent which, when applied to the membrane, will diminish its concavity, pull it out, and increase its resistance. During recent experiments he had been led to think of collodion as a proper agent, which, accordingly, he first tried June 1st, in the case of a middle-aged lady, whose drum-heads were relaxed. A temporary improvement followed. Believing that he had used too little collodion, on June 2d he employed it more freely upon another case which he had treated for three years, lately by means only of tonics. The patient was a woman 40 years of age. She could hear a moderate voice at three feet, hearing vary-

ing. The patient suffered severely from noises of various kinds. The membrane of the left ear showed a number of depressions between the handle of malleus and posterior attachment of the membrane. She could inflate the drum, the depression bulging out, afterward collapsing at once. Collodion was applied freely, the membrane became tense, hearing for voice improved to eighteen feet, and the noises disappeared. Collodion remained adherent till July 28th, and was then but partially loose. On removal of the collodion the membrane was found greatly improved, the depressions had disappeared, but membrane still too lax. Removal of collodion caused little, if any, change, yet it was thought best again to apply it. Dr. McKeown claimed for collodion power to effect the following objects: 1. To rupture adhesions. 2. To rupture even the membrane itself. 3. To restore mobility to a rigid malleus. 4. To keep open an artificial perforation by means of traction. 5. To prevent adhesions in case of recent catarrh. 6. To relieve noises in the ears. 7. To prevent adhesion of the membrana tympani, and retraction of the tensor tympani, also to prevent and relieve labyrinthine pressure. A table of eleven cases was submitted, in which Dr. McKeown had applied collodion to the membrana tympani with satisfactory results.

Dr. Pierce (Manchester) thought much might be done by collodion, but that it should be applied with care. He asked if collodion had a permanent effect in cases of collapse of the membrane.

Dr. Macnaughton Jones (Cork) asked if the collodion were applied in a particular way in different cases, and where.

Dr. McKeown said no danger arose from collodion on the walls of the meatus, as it will not stick. It is used to cover a considerable surface, and has been known to remain adherent for three months.

Thursday, August 7th.

Dr. FITZGERALD, of Dublin, took the chair.

The Audiometer as an Exact Test of Hearing. By LENNOX BROWNE, (London).

Mr. Browne exhibited the audiometer of Professor Hughes, and demonstrated its use. He regarded it as an accurate, uniform, and exquisitely fine method of testing, registering, and comparing the hearing. He remarked that the patient should not be

allowed to see the movements of the instrument. The first advantage of the instrument he considers to be that the zero point is absolute and not personal, since it depends upon a fixed law of electrical induction. Mr. Browne suggested that a certain standard should be adopted, and each instrument marked by some competent authority, the Society of Arts, for instance, to secure uniformity. The audiometer was stated to be useful not only as a test of hearing in deaf persons, but also as promising to afford a standard of hearing power. It was suggested as of possible service in testing the fineness of auditory perception in those about to be educated for the musical profession. The audiometer represents exactly the amount of sound it is necessary to pour out for the sonorous vibrations to be appreciated by the recipient. Each degree on the audiometric scale represents an exact amount of electrical power which electricians can reduce to an absolute measure correlative with other forces. Attention was drawn to the possibility of the audiometer being of service for improving the auditory perception of deaf patients.

Dr. Pierce (Manchester) thought it better to use the scraping noise only, and not the tapping, in working the instrument, and preferred a single movement of the key to rejecting it frequently. He considered no comparison to exist between the watch and the audiometer, and that both should be employed.

Dr. Duncanson preferred a telephone.

Dr. McKeown considered the phonograph as the instrument giving the best sounds for testing hearing.

Dr. Weber-Liel said different effects were found from different kinds of noises in the use of the telephone.

Dr. Jacob (Dublin) thought the audiometer was of much value, but that something more was to be done, *i.e.*, to establish a unit of sound.

Dr. Cassells remarked that something to utilise the human voice as a test of hearing is what we most need.

Dr. Beard, (New York) preferred the stop watch.

Dr. Fitzgerald preferred the voice.

Perforation of the Membrana Tympani. By Dr. BONNAFONT (Paris).

Dr. Bonnafont had perforated the drum-head by means of charcoal points, by various caustics, and twice with the actual cautery, using a stick of charcoal and dragon's blood. The

result was always satisfactory, hearing being present as long as the opening existed. He had thus far been unsuccessful in maintaining an opening beyond a short time.

Cases of Aural Exostosis. By F. M. PIERCE, M.D. (Manchester). The author had met with only nine cases of exostosis in three thousand cases of ear-disease. Six new cases of acquired exostosis, and all the nine occurred in males. Five had exostosis in both ears, and had not had rheumatism or gout. Two cases presented a history of syphilis; three had otorrhœa, but only in one case of the middle ear; in two cases polypi existed with the exostosis. In none of the cases were the exostoses limited to the upper wall of the meatus, nor were there indications of a similar condition in the middle or external ear. The exostoses were almost wholly non-pedunculated; the etiology included chronic periostitis, chronic otorrhœa, gout, rheumatism, and syphilis. The only successful treatment is to remove the exostosis, if threatening complete occlusion, by strong nitrate of silver, followed by chloro-acetic and nitric acids. If these do not prove successful, the galvano cautery; in case of entire closure, the dental engine.

On the Etiology of Aural Exostoses, and on their Removal by a New Operation. By J. PATTERSON CASSELLS, M.D. (Glasgow). Dr. Cassells called attention to the difference between exostosis and hyperostosis, the former being a new growth, the latter a hyperplasia of the osseous tissue of the meatus. He explained the origin and development of an aural exostosis as follows: A subperiosteal abscess formed over the mastoid makes its way out where the least resistance is offered, and discharges; from and around the opening vascular granulations spring up, and increase in size, becoming changed into bony tissue. The new method of treatment consists in passing a loop of wire over the tumor, and, grasping the pedicle firm, a sharp gouge is carried down to the base of the tumor, and two or three blows upon this with a mallet effect the separation of the mass, which it is drawn out by the wire.

Friday, August 8th.

Dr. J. PATTERSON CASSELLS in the chair.

A Contribution to the Knowledge of Fungous Ear-Diseases. By Dr. LÖWENBERG (Paris). Dr. Löwenberg mentioned a peculiar form of fungus of the external meatus, consisting of a small,

closed, oblong, and rather flat bag or cyst. He attributed the cause of fungi, in many cases, to the astringent and other solutions applied to the ear. To prevent fungi he would filter and boil all instillations previous to their use, and would treat fungi by the free application of diluted alcohol, gradually increasing the strength.

Dr. Laurence Turnbull (Philadelphia) thought fungi might be due also to the use of a dirty syringe.

Mr. Lennox Browne (London) agreed with Dr. Turnbull, and recommended glass syringes and the use of antiseptic solutions.

Dr. Fitzgerald (Dublin) mentioned a case in which the disease was traced to the patient having spent much time in a conservatory where there were many geraniums.

Dr. Cassells (Glasgow) attributed fungi to dirt propagated from decaying matter, and to dampness. The constitutional conditions as well as local to be treated.

Tinnitus Aurium. LAURENCE TURNBULL, M.D. (Philadelphia), opened a discussion on this subject. Dr. Turnbull considered tinnitus aurium to be invariably due to an excitation of the terminal filaments of the auditory nerve. He presented a table of three hundred and seventeen cases of ear-disease, in one hundred and sixty-six of which tinnitus was present. In sixty-six the sounds were likened by the patients to "hissing like a steam engine," "buzzing," "whizzing," "pounding," etc. In twenty-two the noise resembled the "ringing of bells," "tapping of a drum," etc. Twenty-three had roaring sounds; seventeen had continuous noises, such as "humming like a fly or bee." Four only presented sounds of a pulsating character. The local disorders accompanying these cases were thickening of the membrana tympani, and alteration of the position of the handle of the malleus from retraction of the membrane in otitis media catarrhalis, subacute or chronic: of such sixty cases. In forty-five otitis externa was the cause. In seventeen cases were present the results of chronic catarrh of the middle ear, together with acute or chronic inflammation of the membrana tympani and ankylosis of the articular surfaces, also thickening and hypertrophy of the mucous lining of the middle ear. Lastly; ten throbbing and four pulsating, with hyperacusis and dizziness. Dr. Turnbull mentioned ten cases in which a peculiar whistling and puffing sound, due to aneurism of the branches of the internal carotid and the temporal

branch, was present; also, two others in which disease of the heart was accompanied by a "jumping" or "roaring" character. He thought tinnitus was rarely of a nervous origin, but generally due to pathological conditions outside the brain proper. According to the etiological classification of Greene & Fisher, of Boston, endorsed by Jurasz, Epstein, and Hemming, we have the following: 1. Physiological murmurs in the internal carotid dependent upon partial stenosis of the carotid canal. 2. Pathological murmurs in the internal carotid, probably due to reduced vascular tension. 3. Pathological murmurs from aneurism of vessels of the head. Tinnitus is rare as a symptom of cerebral disease. Dr. Turnbull spoke of the importance of treating the upper air-passages on account of the swollen and hypertrophied mucous membrane covering the turbinated bones, which prevents air from entering the Eustachian tubes.

The Forms, Causes, and Treatment of Tinnitus Aurium. By W. DOUGLAS HEMMING, M.R.C.S.E. (Bournemouth). Mr. Hemming gave, in a tabulated arrangement, the various forms of tinnitus with their respective causes. 1. Tidal to-and-fro noises, due to tobacco and chronic middle ear catarrh. 2. Humming or buzzing noises, caused by impacted cerumen, eczema, foreign bodies or parasites in the external meatus. 3. Gurgling or bubbling noises, due to fluids in the tympanum or Eustachian tubes. 4. Rustling or crackling noises, due to deficiency of cerumen, hairs on the membrane or in the meatus, and acute catarrh in its later stages. 5. Constant rushing noises caused by venous congestion of the labyrinth. Extra-aural causes are aneurism of a neighboring vessel or of the aorta, anæmia, overwork of the brain, gout, obstructed portal circulation, mechanical causes, infantile diseases, cerebral diseases, etc. Intra-aural causes are: 1. In external ear,—inflammation, dried pus on the membrane, aspergillus, etc. 2. In the middle ear,—adhesive mucus on the membrane, in the tympanum or Eustachian tube, acute or chronic catarrh, etc. 3. In internal ear,—labyrinthine congestion, arterial or venous. Treatment,—Extra-aural cases require constitutional measures; intra-aural, for inflammation of external meatus, the usual measures recommended. In the condition of the middle ear causing tinnitus, the posterior nasal douche advised, and, also, vapor inhalation of benzoin, creosote, etc., forced in by Politzer's or Valsalva's method. In acute tympanic catarrh, the aural douche, leeches,

paracentesis of drum-head, etc. To overcome contraction of intrinsic muscles Mr. Hemming advised drawing out of the membrane by Siegle's speculum; to restore muscular tone, electricity; as a last resort division of tensor tympani. For labyrinthine congestion hydrobromic acid was recommended.

Dr. Turnbull (Philadelphia) had found electricity of little use. Had employed injections of hydrobromic ether with good results.

Mr. Hemming replied that he thought he had obtained good results from electricity.

Dr. Edis spoke of lactation as a cause of tinnitus.

Dr. Pierce thought there were vascular and nervous causes of tinnitus. He favored the use of hydrobromic acid, but not electricity.

Mr. Lennox Browne objected to putting water into the ear in applying electricity. Had found hydrobromic acid of much benefit.

Dr. Woakes thought hydrobromic acid of use when there was a want of vaso-motor control of the vertebral artery.

The following papers were taken as read:

On the Occurrence of Exostosis within the External Auditory Meatus in the Pre-historic Man. By CLARENCE J. BLAKE, M.D. (Boston).

Ear Diseases and Life-Assurance. By J. PATTERSON CASSELLS, M.D.

Note on Tinnitus Aurium. By S. SEXTON, M.D. (New York).

1. *Inflation of the Middle Ear in cases of Cleft Palate, both before and after Staphyloraphy.*

2. *Chloroform-Vapors in Inflation of the Middle Ear.* By C. S. TURNBULL, M.D. (Philadelphia).

AN ABSTRACT OF AMERICAN OTOLOGICAL LITER-
ATURE FOR THE THIRD QUARTER OF 1879.

By SWAN M. BURNETT, OF WASHINGTON.

1. *Objective snapping noises in the ear, by W. R. Amick, Cincinnati Med. News, September.*

The patient was a young woman of 30, troubled with pain in the cardiac region. When 18 years old, after some "fainting spells," she first noted the snapping noises. They are loudest when she is excited, and can then be heard at a distance of four feet. A very slight movement of MT. can be observed when the sounds are loudest. It is not very certain whether the tone of the tuning-fork is altered by them. There are about 54 "sounds" per minute, the pulse being 80, but there is no regularity about their occurrence. The cavity of the drum is considered healthy, and hearing is normal. A. thinks the tensor tympani passive, and that the sounds are created by the action of the tubal muscles. These muscles, he thinks, in accordance with the at present generally accepted theory, open the mouth of the tube during contraction. No mention is made of an examination of the mouth of the tube during the sounds.

2. *Chronic suppurative inflammation of the middle ear, by O. D. Pomeroy, N. Y. Medical Record, July 26 and August 2.*

In these lectures Dr. P. considers the subject of chronic suppurative inflammation in all its details, from etiology to treatment. The principal point in etiology, which we shall notice, is that he considers the employment of the nasal douche, however carefully used, quite a frequent cause of the trouble. As regards treatment, he places, of course, particular stress on cleanliness; and this he accomplishes not as much by syringing as by the use of absorbent cotton. The astringent most in favor with him is the nitrate of

silver in solution from 10 grs. to \mathfrak{z} j up to saturation according to indications. If the opening in the MT. is small, he does not hesitate to enlarge it so that the astringent can enter into the tympanum freely. He removes polypi first, by means of forceps (preferably Hinton's), and then applies argt. nit. sol. In case the argt. nit. fails, he uses acid nit. or acid nit. of mercury.

Aural therapeutics, by L. Turnbull, Medical and Surgical Report. August 2.

Dr. L. claims that as regards the therapeusis of ear troubles, as good results can be shown as in the same character of practice in other departments. He then proceeds to consider the action and application of various drugs in the treatment of aural diseases. Aconite he has found of very essential service in acute catarrh, attended with pharyngitis and fever, in doses of from 1 to 5 drops of the tinct. of the root. Digitalis he uses in delirium, tinnitus aurium, etc.; strychnia in atrophy of the auditory nerve. The bromides he employs in sleeplessness, nervousness, etc., associated with subjective sounds.

The sudden deafness of syphilis, with cases by, S. Sexton, American Journal of Medical Sciences, July.

The *conclusions* at which S. arrives are :

1. "Syphilitic affections of the ear, inducing sudden deafness, are of exceptional occurrence, and—
2. "They would seem to be induced by pre-existing hyperæmia in the ear, excited by sympathetic relationship, or by an inter-current attack of aural mucous catarrh.
3. "The attacks are characterized by their sudden occurrence, and both ears are usually affected simultaneously, although the contrary sometimes takes place.
4. "The deafness is always very great.
5. "This syphilitic affection speedily causes a disarrangement of the integrity of the chain of ossicles most likely at the malleo-incudal joint, probably in some instances at the stapedo-incudal joint, or both of these. The movements of the stapes in the oval window are also likely to be interfered with. The two first mentioned conditions serve to explain the noises in the ears, and the autophony; the last-mentioned condition would increase the anomalies of hearing.
6. "The affection does not depend, so far as we know, on anomalies of any portion of the labyrinth, although the latter, of

course, is liable to invasions from syphilis, with the nature of which we are yet unfamiliar.

7. "The disease is usually unattended by pain in the ears; it is non-purulent, and its incurability is characteristic."

We think there are aurists who would decidedly dissent from Dr. S's views as regards the seat of the lesion in the cases given. All the symptoms are such as we are accustomed to refer to labyrinthine troubles, and while undoubtedly there were grave alterations found in the conducting apparatus, the question is pertinent as to whether they are in and of themselves sufficient to account for the character and severity of the symptoms present. Even in cases of middle ear trouble from ordinary causes, where such severe symptoms and such profound deafness are present, we can very justly suppose a labyrinthine complication, but such a supposition is rendered still more justifiable when we have syphilis as a cause, from whose invasions no locality or tissue seems to be free.

On the use of permanganate of potassa in chronic otorrhæa, by Lucien Howe, Buffalo Medical and Surgical Journal, August.

H. has had a very good experience in the employment of this remedy, some of his cases having been treated without benefit by other astringents. He simply causes the patient to syringe the secretions out carefully, and then pour in a solution of the salt of the strength of from two to six or eight grs. to the ounce of water twice daily, or oftener if the discharge is profuse.

THE AUDIPHONE AND DENTAPHONE.

By CHAS. S. TURNBULL, M. D., OF PHILADELPHIA.

FOR many years various inventors have been engaged in devising some means whereby the deaf could be relieved from their infirmity, be enabled to hear spoken words and carry on conversation with those around them. One device has succeeded another, each only leaving the sufferer more disappointed than the last, until finally he has given up all hopes of relief, or, as in certain cases, is compelled to fall back on the clumsy, old-fashioned ear-trumpet. In a large number of instances, however, even the ear-trumpet could not be used, as the defect in the hearing was of such a nature that the sound vibrations, however intensified by an ear-trumpet or other device, could not be transmitted through the external or middle ear to the auditory nerve. Under these circumstances no advance seemed possible in the way of enabling the deaf to hear, and those who best understood the difficulties to be overcome could give no hopes of success.

The wonderful accuracy with which the phonograph and the telephone registered and reproduced the human voice, taken in connection with the fact that the nerves of hearing could be reached directly through the teeth and the cranial bones, led to the conclusion that if some instrument could be devised, sensitive enough to gather up the delicate sound vibrations that make up articulate speech, and convey them to the teeth, the problem of enabling the deaf to hear would be solved.

The instruments under consideration are the results of a long series of experiments based upon similar scientific facts, with which is coupled another acoustic principle, viz.: the superior power possessed by solid bodies of conducting or transmitting sonorous vibrations. To demonstrate this we would call attention to the tuning-fork, acoumeter, or watch, when placed on the teeth or cranial bones.

The first instrument to which our attention was directed was called the "audiphone," by its inventor, R. S. Rhodes, of Chicago, who, while searching for some means by which he might improve his hearing,* accidentally placed his watch between his teeth, and heard it ticking. After numerous experiments, based upon this observation, the inventor was completely successful in his own case, and the instrument with which he readily hears all ordinary sounds and conversations is the one he now offers to the afflicted public.



FIG. 1.

The instrument (Fig. 1) consists essentially of a diaphragm of hard rubber. This diaphragm is very thin and elastic, and is cut in the form of a square with rounded corners, so as to present a collecting surface about one square foot in size. For purposes of convenient adjustment, it is furnished with a neat hard-rubber handle, and might easily, says the inventor, be taken for a fan of Japanese pattern. When in use the upper and lower edges are made to approximate by a silken cord, so as to present a convex surface to the speaker and a concave one to the listener. The cord may be fastened at any convenient convexity of the surface of the auditory disk. When adjusted, the upper edge is pressed firmly against the anterior surface of the upper incisors, allowing the upper lip to rest upon the diaphragm, and the deaf person is then ready to listen. If the eye-teeth can be used, they generally give the best results. False teeth may also be used, especially if they fit tightly; should they not, however, they may be made to do so by pressing the

* Mr. R. lost his hearing through changes due to a chronic aural and post-nasal catarrh.

lower teeth against them. If the natural teeth be too far gone to be used as directed, the roots may in many instances be utilized by having artificial teeth set into them. The handle of the audiphone should be held lightly, and the lower teeth should not touch the diaphragm, nor should it be held between the teeth or pressed too forcibly against the upper ones, thus curving the instrument already bent by the cord. It must be borne in mind that in all cases the vibrations of the upper edge of the disk impart to the upper teeth the sound-waves, which are transmitted through them to the cranial bones and auditory nerves.

The audiphone, therefore, is entirely dependent upon the condition of the auditory nerves, because in direct proportion to the inherent power of these nerves—independent of the external and middle ears or acoustic apparatus—is the influence which this and all similar appliances will exert over the hearing power.

Before, however, we can arrive at any satisfactory conclusions concerning the actual practical value of the audiphone, we must define the words "deaf" and "deaf-mute" as ordinarily accepted, because upon a proper appreciation of the meaning of these common and vague terms, hinge the merits of the instrument for which miracles are inadvertently claimed by its inventor, and ignorantly ascribed to it by the public.

To the medical man the word "deaf" is generally understood to express diminution of hearing power to any degree, unless the term be qualified by some word expressing the amount of deafness, be it partial, profound or absolute.

To the layman, the word "deaf" implies absolute deafness, while to him degrees of diminution of hearing power are best understood as "hardness of hearing," etc.

Again, to the medical man, the word "deaf-mute" is equally unsatisfactory, although it is usually understood to express absolute deafness since birth, hence muteism, unless the term be likewise qualified by some such prefix, as partial, semi or absolute, is too vague an expression.

To the layman, the word "deaf-mute" is understood to mean precisely what, when taken separately, the two words imply.

In this particular connection we have assumed that "the deaf," as a class, should be divided into—

a. Those who are *absolutely* deaf from *nervous* or *inner ear* deafness.

b. Those who are *profoundly* deaf from *acoustic* or *middle ear* deafness.

And likewise the "deaf-mutes" as a class into—

c. Those who are *absolute deaf-mutes*.

d. Those who are *semi-deaf-mutes* (and semi-mutes).

Absolute nervous deafness (a), which is comparatively rare, is in no way whatever benefitted by the application of the audiphone.

This deafness is caused by *direct implication of the auditory nerve*, through malignant, scarlet and typhoid fevers, cerebrospinal and other forms of meningitis, tertiary syphilis, cerebral tumors, trauma, consanguinity, hereditation, old age, etc.

Profound acoustic deafness (c), which is likewise comparatively rare, is markedly, and in some cases signally, relieved by the use of the audiphone.

This deafness is caused through *direct implication of the middle ear* (or conducting apparatus) and its appendages, through the several forms of catarrhal and purulent inflammations, scarlet and typhoid fevers, secondary syphilis, trauma, consanguinity, hereditation, old age, etc.

Those who are *partially* deaf, from whatever cause, as a rule derive no benefit from the application of the audiphone; on the contrary, many such cases are annoyed by hyperacusis, etc.

Therefore the number of cases in which "the deaf are made to hear" with the audiphone is comparatively small, when we take into consideration the whole number of our deaf population. Audition will be improved by its use in but few of the many deaf persons who enlist the services of an aurist.

To use the audiphone with success the auditory nerves must be normally sensitive, the hearing power for loud voice, through middle ear deafness, must be reduced to a minimum, and the upper front teeth must be solid. The

acoumeter, the tuning-fork, a thin sheet of vulcanite, of iron, of ash or poplar wood, and, best of all, a sheet of bristol-board or sized paper, will in every case enable us to decide whether the audiphone or its principle can be successfully applied.

Proficiency in its use requires practice, and those who for a long time have not heard ordinary conversation or their own voices, and who are accustomed, wholly or in part, to interpret sound by the movement of the lips of the person speaking, may not distinguish the words of the speaker when first using the audiphone, though the sound of these words be distinctly heard. The inventor being well aware, doubtless through experience, of the fact that when those with impaired hearing know what to expect, they hear twice as well, offers the following as a method of practice that will enable many such to rely wholly upon sound: "Such persons should request a friend to read aloud, while they (the listeners) should carefully observe the words (as spoken) in a duplicate book or paper. When this is properly done, deaf persons will be surprised with what distinctness every word may be heard by the use of the audiphone, and they can in this way *educate* themselves."

Concerning *absolutely deaf-mutes* and the audiphone, we need say nothing further. They must be left to the patient teachers of the several methods of educating the true deaf-mutes.

To the *semi-deaf-mutes*, however, the audiphone will open a new world of enjoyment, and prove a useful instrument, especially in the hands of all instructors in our asylums for the deaf and dumb. In educating children according to Bell's method of visible speech, especially as very few even of those who are supposed to be born deaf are totally without some slight degree of hearing power, hence, nearly all of those educated in the asylums may be taught to speak, inasmuch as their dumbness is owing solely to their want of use of the organs of speech. Mutes, says the inventor, will learn to speak by holding the audiphone against the teeth, as already directed, and practice speaking while it is in this position. A good exercise for the mute, at first, to

put one hand on the instructor's throat, watch the motion of his lips, while his other hand is on his own throat, the instructor meantime holding the audiphone to the mute's teeth. The mute will *feel* the influence of the sound in his hand on the instructor's throat, imitate it in his own throat, will *hear* the speaker's voice on the audiphone, and will be aided in imitating the speaker by *seeing* his lips, and will also *hear* his own phonation sounds as reflected from the audiphone, and the more readily therefore learn to articulate.

Music, its varying sounds and harmonies, as conveyed by means of the audiphone, awakens in the semi-deaf-mutes an unusually pleasurable sensation, as manifested by their gesticulations and facial expression.

Under the pretext of being a fan the instrument can seldom be used, and, being cumbersome and conspicuous, is open to the same objections as the ear-trumpet.

Since the advent of the audiphone, we have seen several markedly successful cases of its application, but, as a rule, we think the instrument has been overestimated, and Mr. Joshua Foster, the able Superintendent of the "Pennsylvania Asylum for the Deaf and Dumb," we are sorry to say, was not favorably impressed with the audiphone, although we have heard through other sources of the satisfactory trial of the instrument.

The appliance is, however, in its infancy, and will no doubt be modified to meet many objections and requirements, but in so far as Mr. Rhodes has exerted his ability and ingenuity, we certainly think he is entitled to great praise, not only for his novel invention, but for its novel application.

The opera or concert audiphone is said to possess double power, but as the majority of those who can successfully wield the single disk instrument can use the latter for conversation or concert alike, we do not attach much importance to the double disk instrument. This latter consists of two disks, each about the size of the conversational, fitted into the same base, about a quarter of an inch apart, and separated at the upper edges the same distance, suf-

ficiently to be evenly adjusted to different teeth, so that each disk may act independently of the other. The upper edge of each disk is set against *different teeth*, thus giving the vibration of a whole disk to each tooth, and thereby almost doubling the power. This form of audiphone is particularly well adapted for semi-mutes, not only because the sound received is of greater volume and more distinct, but also the voice of the semi-mute when spoken between the disks is very considerably intensified, and therefore the more distinctly heard by himself.

"THE DENTAPHONE"

is a novel instrument of the same practical application and acoustic principle as the audiphone, but constructed more after the plan of the telephone. It is made by the American Dentaphone Co., of Cincinnati, and is a more ingenious and well made appliance.

It is represented at Fig. 2, and consists, in brief, of a

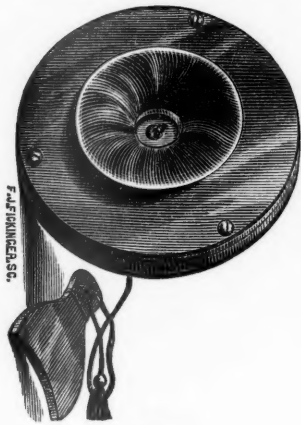


FIG. 2.

chambered box (similar to a telephonic mouth-piece) in which is secured an exceedingly delicate, easily vibrating, diaphragm. Connecting this with a wooden tooth-piece is a silken cord of variable length. The person using the dentaphone simply holds the instrument receiver in his hand in any convenient position, with the tooth-piece between the teeth, and the open side of the receiver facing toward the speaker. The silk

conducting line connecting the receiver with the tooth-piece should be kept moderately tight, and may be shortened or lengthened to suit the convenience of the person using the instrument.

The dentaphone weighs but one ounce and a half, and can easily be carried about the person. In testing the instrument, it compares most favorably with the audiphone, and answers fully as well for all requirements.

It is used for precisely the same class of cases as are improved by the audiphone, and bids fair to be a powerful rival.

Concerning an appropriate or descriptive name we would prefer the term "Dento-Audiphone," and recommend the substitution of fans (made of thin elastic wood, "bristol" or "binder's board") which are to be held between or against the teeth, and bent into a curve by pressure from the handle towards the teeth.

REPORT OF THE PROGRESS OF OTOLOGY IN THE SECOND HALF OF THE YEAR 1878.

I. REPORT ON NORMAL AND PATHOLOGICAL ANATOMY.

BY DR. H. STEINBRÜGGE.

Translated by JAMES A. SPALDING, M.D., Portland, Maine.

1. On exostosis within the ext. aud. meat. By PROF. TURNER. *Journal of Anatomy and Physiology*, normal and pathological, conducted by G. M. Humphrey, etc., vol. xiii, part ii, page 200.
2. Zur Anatomie des Warzenfortsatzes. [On the Anatomy of the Mastoid Process.] By Dr. E. ZUCKERHANDL. *Monatssch. für Ohrenhklde.*, 1879., No. 4.
3. Der Aquæductus cochleæ beim Menschen. By WEBER-LIEL. *Monatssch. für Ohrenhklde.*, 1879, No. 3.
4. Ueber Sinusthrombose, Meningitis, Kleinhirnbrainabscess nach Otitis media. [On thrombosis of the sinus, meningitis, and abscess of the cerebellum, after otitis media.] By Dr. E. F. KKETSCHY. *Wiener Med. Wochens.*, 1879, Nos. 11 and 12.
5. Beiträge zur Pathologie und Pathologischen Anatomie des Ohres. By Dr. ALBRECHT BURCHARDT-MERIAN. *Arch. für Ohrenhklde.*, Bd. xiv, Heft iii.
6. Ein Fall von primärem Epithelial-Krebs des äusseren Gehörganges. [A case of primary epithelial cancer of the ext. aud. meat.] observed by Dr. DELSTANCHE, Jr., and Dr. STOCQUART (Brussels), and translated into German by Dr. Blau. *Arch. für Ohrenhklde.*, Bd. xiv, Heft i.
7. Pathologisch-Anatomische Untersuchungen über Ozoëna. [Pathological and anatomical investigations on ozoëna.] By Dr. EUGEN FRÄNREL. *Virchow's Archiv*, Bd. lxxv.
8. Zur Pathogenese des Hirnabscesses. [On the Pathology of abscess of the brain.] By Dr. OTTO BINSWANGER. *Breslauer Aerztl. Zeitschr.*, No. 9, 1879.

In November, 1878, Turner (1) came into possession of an artificially deformed skull from a saltpetre mine in Peru. Both external aud. meat. were almost closed by exostosis. As it is a matter of doubt whether these new-formations can be due to the pressure to which such skulls are subjected from childhood, Turner examined the artificially malformed skulls in the Edinburgh Museum, and amongst seventeen he found but one, that of a Chenook Indian, with exostosis in both ext. aud. meat. In three others the ext. aud. meat. appeared, however, compressed in diameter from in front backwards, but Turner has seen these somewhat slit-shaped narrowings in many Peruvian skulls which had not been artificially compressed. Since the pressure exercises no further influence on the sphenoid bone and the surrounding portions of the ext. aud. meat., the author believes that he must deny its causal connection with the exostosis. Seligmann's and Welcker's papers on this same subject are also noticed.

Zuckerkanal (2) found in a body of a man whose organs of hearing offered no other abnormality, the mast. proc. without air-cells, but consisting of diploetic tissue filled on one side with fat. This discovery led to the examination of 250 ears, the manifold combinations of whose mastoid cells are communicated in detail in the original. While most authors have hitherto assumed that the air-cells in the mast. proc. occupy the greatest space in a majority of cases, with the diploetic tissue confined only to the summit of the apophysis and its medial walls, Zuckerkanal discovered that the air-containing and diploetic substances occurred alternately, even the whole process might be reduced to diploetic bone filled with fat. The cells were often so narrow that they appeared sclerosed. The cases also in which only air-cells were found, varied greatly in the size of the cells; those of the squamous portion predominating in size over those of the petrous portion. Larger cavities were also now and then found. In one case the whole process was seen to be occupied by a cavity, with ridge-like projections from its walls. The number of wholly pneumatic mast. processes was 39.8 per cent.; of wholly diploetic, 20 per cent.; while the mixed cases however made up the majority, 43.2 per cent. From this latter condition Zuckerkanal explains the frequent failure of injections in making preparations by corrosion, while Hyrtl ascribes this to the air contained in the cells.

The researches of Weber-Liel (3) confirm the statements of

Cotugno, who found, besides the real aquæductus cochlea, a venous canal running parallel with it, and ending in the scala tympani of the cochlea. The author accentuates the fact that the external opening of the passage is found within the posterior cranial fossa, and believes that it communicates with the sub-arachnoidal sinus, lying between the cerebellum and medulla oblongata. The entrance into the aquæduct, bounded above by a bow-shaped bony prominence, the *janua arcuata* Cotunni, leads first into a triangular furrow, the lower angle of which discharges into a fissure appointed for the glosso-pharyngeal nerve. Then the nerve, separated from the vagus by a lamella of dura mater, seems to enter the beginning of the aquæduct, but at once bends around, and leaves the cranial cavity, running along the furrow mentioned above. Another fold of the dura mater forms the upper boundary of the aquæduct, while the lower bridges over the sheath separating the 9th and 10th pairs, the *bulbus jugularis*, and so shut off the cranial cavity below. The author tints the canals in question by aspiration of a red or blue fluid, by drilling a hole into the super. semi-circular canal, gluing into it a glass tube, which he unites with a stomach pump. The canal can then be followed with a bone-shaver and file. A lining of dura mater passes into the aquæduct. Its length amounts to 11-13 mm. It runs in a slight curve, nearly level, and parallel with the vein, separated from the latter in the middle by a bony plate 1 mm. thick, to the cochlea, where both canals again approach to within $\frac{1}{3}$ mm. and end close to the membrane of the fenest. rot. The aquæduct here widens again somewhat in the shape of a funnel. It does not contain any venous branch, but establishes a union of the perilymph with the arachnoidal spaces, while the vein just described opens into the sinus jugularis or petrosus inf. and lies in its course inward and in front of the aquæduct.

Kretschy (4) publishes three cases of fatal purulent inflammation of the middle ear, the cause of which will be described further on under section iv. In the first case, the left transverse sinus was found completely filled with an adherent plug, which in the middle was softened with pus. The sinus jugularis was filled with pus, and a defect in its anterior wall led to the rough, discolored petrous bone. The tympanum was filled with cholesteatomatous masses shining like mother-of-pearl. The fibrous tissue about the *vena jugularis sinistra*, was infiltrated with

serum and pus from the lower jaw to the vena anonyma which contained a plug, which extended into the vena jugularis. The interior of the vein was thickened and ulcerated in spots.

In case 2, the autopsy showed at various spots an infiltration, partly serous and partly purulent of the inner membranes of the brain, as well on the convexity, as at the base of the cerebrum, at the edge of the left cerebellar hemisphere, as at the lower convolution. The left *M. T.* was destroyed, with but little pus in the tympanum. The author assumes that the sheath of the acusticus or facialis had transmitted the inflammation to the meninges.

Case 3, disclosed an abscess as large as a walnut in the left hemisphere of the cerebellum, and hydrocephalus internus. The connection with the ear-disease could not here be demonstrated.

Burckhardt (5) communicates four cases of chronic purulent inflammation of the middle ear. The first was that of a girl, æt. 19, who had suffered since childhood with left-sided otorrhœa, and who died with meningitic symptoms after an illness of sixteen days. At the autopsy the left trigeminus, acusticus and facialis were found embedded in pus, with circumscribed purulent infiltration of the pia mater at the base of the cerebrum, as well as at the surface of the cerebellum. A thrombus was also discovered at the left petrous bone, in the sinus petrosus superior. The bony channel of the latter, as well as the posterior wall of the pyramid, were perforated like a sieve, and these openings communicated with the antrum mast. The mucous membrane of the middle ear was thickened and the tympanum filled with polypoid granulations. A larger polypus passing out through the perforated *M. T.* filled the aud. meat. completely, and a smaller growth springing from the edge of the perforation closed the entrance of the tympanic tube. The antrum appeared unusually small, and the mastoid cells were wholly absent. The author draws attention to the unusual path by which the pus reached the brain. An operative interference was not undertaken, as meningitis was already present.

The other cases were of children of two and two and three-quarter years, and one of seven and one-half months, who died of tuberculosis of the meninges and organs of the chest and abdomen. The second case was marked by partial necrosis of the left wall of the sinus, while a plug filled the sinus itself and the bony walls of the sulcus transversus showed carious openings.

The girl seven and one-half months old (Case 3) had suffered from carious destruction of the left tympanum, bones of hearing and mast. proc., leading to a necrosis at the lower wall of the parietal bone. A girl of two and three-quarter years (Case 4, showed multiple caries on the skull, destruction of the left *M. T.*, hammer and anvil, as well as necrosis of a portion of the mast. proc., extending to the floor of the sulcus transversus, without leading to thrombosis of the sinus. The beginning of the disease of the ear dated, perhaps, from a fall upon the head.

The case of epithelial cancer published by the authors (6) was that of a woman, æt. 48, who, up to the age of 14, had suffered from right-sided otorrhœa. She came for treatment February 14, 1878. For a year she had noticed at the inner surface of the right tragus a small, hard nodule, which ulcerated and led to continually advancing destruction, accompanied with violent pains in the whole right half of the head. The bottom of the meatus seemed enlarged and filled with granulations, which hindered a more accurate view into the tympanum. A blind fistula, 1 *cm.* deep, without secretion, and perhaps originating from former caries, was found on the mast. proc. Violent subjective tinnitus, hearing for voice, as well as bone conduction for the tuning-fork, were still present on the right side. The treatment consisted in galvano-cautery, injections of a solution of chloride of lead, and morphia. By the end of March the disease had advanced toward the right orbit, the condyloid process of the lower jaw had yielded towards the left, the fibrous tissue of the neck was infiltrated, and the glands of the neck were swollen. In May the right facialis was paralyzed. In June the destructive process had attacked the skin behind the ear, the auricle was loosened, but only affected by the cancer at its closest connection with the meatus. Loss of sight in the right eye, impairment of the senses of smell and taste next ensued. Death followed in October, 1878.

At the autopsy, the brain was found normal in spite of extensive destruction of the temporal, sphenoid and frontal bones. The dura mater was intact, with exception of the envelope of the middle cranial fossa and a few spots at which it appeared thickened, and displayed a deposit of round, whitish bodies. A cancerous, cylindrical growth had penetrated the right external orbital wall. The nasal passages, posterior nasal cavity, pharynx and larynx, had been spared. Of the bones of the face, the right zygoma with the proc. zygomaticus, the ascending ramus of the lower jaw,

and a portion of the upper jaw had been invaded by the morbid process. The *M. T.*, hammer and anvil were destroyed ; the plate of the stapes preserved. The sclerosed mast. proc. had resisted the destruction. The pharyngeal mouth of the tube was normal, and the tube permeable to air. The parotid gland, muscles, vessels and nerves of the whole neighborhood were, with a few exceptions, destroyed. The authors are of the opinion that the cancerous affection, at all events primary in the organ of hearing, had probably first developed itself on the tragus. The bones were gradually softened and destroyed, without formation of sequestra. The dura mater, as well as the bucco-pharyngeal fascia offered noticeable resistance to the advance of the neoplasm, owing to their fibrous structure.

E. Fränkel (7) communicates the results of four autopsies at the Hamburg Hospital, which offer a valuable contribution to our knowledge of the pathological alterations which may develop the symptoms of ozæna. Two of the subjects had died from phthisis, while the others exhibited syphilitic symptoms, besides the disease causing death. The first case (phthisis) showed hyperplastic inflammation in the sphenoid bone and Highmore's antrum, and on the other hand atrophic inflammation of the nasal mucous membrane, atrophy of the glands, fibrous transformation of the mucous membrane, secondary atrophy of the turbinated bones, but no ulcers except one near the tonsilla pharyngea. In the three other cases there was disease of the bone and the mucous membranes, more or less extensive loss of substance on the bones of the base of the skull, at the proc. pterygoideus, the partition wall of the nose and the side walls of the nasal cavity. In case 2 only (a syphilitic girl) had the otitis resulted from ulcers of the mucous membrane, while in cases 3 and 4 (phthisis and syphilis) the bones appeared primarily affected, since the mucous membrane showed no ulcerations, nor ulcerative scars. In the first two cases, the three turbinated bones were atrophied, in the third case the lower only. In case 4 they were preserved. In cases 2 and 3 the mucous membrane of the throat was affected at the same time, since on the one hand was found atrophy of the glands and infiltration with small cells, on the other, gray discoloration of the mucous membrane caused by thickening of the epithelium. The remaining numerous combinations of the pathological alterations, as well as the microscopic conditions, cannot here be abbreviated, but must be studied in the original. The author concludes from these four

cases, that the morbid causes imputed as the origin of ozæna, viz. : chronic rhinitis, caries, purulent inflammation of the neighboring cavities and syphilis, either by themselves or combined can cause the symptoms of ozæna, and that also a single exclusive cause does not exist, but on the contrary in most cases a discrasia is at the bottom. The epithelial alterations of the mucous membrane of the throat are not characteristic for ozæna, but appear idiopathically.

Binswanger's article (8) treats of the rarer cases of abscess of the brain originating after purulent inflammation of the middle ear, in which the abscess is not found near the morbid focus, but is surrounded by normal brain substance, and the morbid process has not been conducted along the well-known paths. Carious portions within the petrous bone, as well as purulent inflammation of the middle ear, can lead to the formation of abscess in the brain by metastasis without the roof of the tympanum, the dura mater or the petrous bone being on the whole coincidentally implicated (Gull).

A case of this sort is next described.

A man, æt. 51, in whom neither discharge from the ear nor deafness had been observed, died after an illness of eight weeks with fever, loss of appetite and vomiting, with which were associated paralysis of the left arm, and just before death an epileptiform attack, clonic convulsions of the extremities, with extensive bed-sores and dilatation of the right pupil. The autopsy revealed, besides abscesses in both lower lobes of the lungs, an encapsulated abscess of the brain, as large as a walnut, in the medullary layer of the right first frontal convolution. The brain, sinus and dura mater were normal ; the roof of the right tympanum somewhat red, but otherwise normal. The right tympanum was partly filled with spongy granulations, and a similar focus of granulations was found in the mast. proc. The *M. T.* was almost wholly destroyed, but the small bones were preserved. The author then discusses the way in which the inflammatory process was spread, and reaches the conclusion that the parasitic micro-organisms propagate themselves through the interfascicular spaces of the connective tissue surrounding the vessels, and thus cause metastatic abscesses in a distant portion of the brain. Perhaps more accurate researches within the brain in similar cases will discover detached and smaller foci of pus, indicating this path of propagation.

II. PHYSIOLOGY OF THE ORGAN OF HEARING.

BY DR. OSCAR WOLF, OF FRANKFORT-ON-THE-MAIN.

1. Dr. CLARENCE J. BLAKE, Boston. The graphic and photographic illustration of sound-waves. *The American Journal of Otology*, vol. i, part 1, January, 1879, and part 2, April, 1879.
2. Dr. CLARENCE BLAKE. Die Verwendung des Trommelfelles als Phonautograph und Logograph, [The use of the membrana tympani as Phonograph and Logograph.] *Arch. Ophth. and Otol.* vol. vii, p. 457. *Zeitschr. für Ohrenhlkde.*, Bd. viii, Heft 1.
3. Dr. OSCAR WOLF, Frankfort. Versuche mit dem Edison'schen Phonographen. [Experiments with Edison's Phonograph.] *Zeitsch. für Ohrenhlkde.*, Bd. viii, Heft 1. *Arch. Otol.* vol. viii, p. 58.
4. Prof. E. BERTHOLD, Königsberg. Analyse der im Nebengeräusche einer Stimmgabel enthaltenen Töne. [Analysis of the tones contained in the secondary noise of a tuning-fork.] *Zeitsch. für Ohrenhlkde.*, Bd. viii, Heft 2. *Arch. Otol.* vol. viii, p. 250.
5. A. D. STEWART, B.D. The ratio of the normal sensibility of the sound-conducting apparatus, to sound impressions of least intensity.] *Glasgow Med. Journal*, vol. xi, May, 1879.
6. Prof. W. PREYER, Jena. Akustische Untersuchungen. [Acoustic investigations.] *Samml. phys. Abhandl.*, von W. Preyer Zweite Reihe, 4. Heft. Jena, bei Gustav Fischer.
7. Dr. ADOLPH KLÜNDER, Hemstedt. Ueber die Genauigkeit der Stimme. [On the accuracy of the voice.] *Arch. f. Anat. und Physiol.*, von Hiss, Braune und Du Bois Reymond. *Phys. Abtheil.*, 1. und 2. Heft.
8. Prof. V. HENSEN, Kiel. Ein einfaches Verfahren zur Beobachtung eines gesungenen Tones [a simple experiment for observing a tone when sung]. *The same Archives*.
9. Dr. FR. KOLÁČEK, Brünn. Ueber den Einfluss des den Schall leitenden Mediums auf in ihm schwingende Tonquellen [On the influence of the medium conducting the sound upon the sources of sound vibrating within it]. *Annalen der Physik und Chemie*, von G. Wiedemann. 1879, No. 5.
10. BENJAMIN W. RICHARDSON, M. D. Some original researches with Prof. Hughes' new instrument for the measurement of hearing, the audiometer. *Medical Times and Gazette*, No. 1508, May 24, 1879. (*Preliminary communication*).
11. Zur Würdigung der Ohrenprobe. [On the value of the ear-test] Dr. A. Lesser. Eulenberg's *Vierteljahrs. für ger. Medi-*

cin., January, 1879, see review in No. 13 of the *Deutch. Med. Wochenschr.*

Blake (1) gives us in the first part of his paper an historical review, beginning with Wil. Weber's method of representing the vibrations of sound graphically (*Akustik*, 1830). He then mentions Duhamel's vibroscope, (Paris, 1849,) König and Scott's phonautographs as predecessors of the telephone discovered by Reis, describes the physiological works of Donders and Politzer on the representation of the vibrations of the *M. T.* and chain of bones, and so gives us a very interesting contribution to the history of the developement of the phonograph. Edison was the first to construct an instrument for telegraph offices (embossing translator) by means of which the letters of the Morse apparatus printed themselves on a strip of paper, and could then be reproduced by the magnet and lever. In July, 1877, he replaced the magnet and lever by a membrane with pencil, and so discovered that speech could be reproduced mechanically.

Blake next reminds us of the still existing defects in the phonograph (which the reviewer has also noticed in his paper cited as No. 3 in this report), mentions his experiments to use the human *M. T.* as phonautograph and logograph, and finally S. Th. Stein's method (*Das Licht im Dienste wissenschaftlicher Forschung*) of photographing the vibrations of sound. Blake is also of the opinion that whispers are especially suitable for analyzing the acoustic character of the sounds of speech.

In the second part of his paper Blake compares the value of the graphic and photographic methods for the permanent transfer of waves of sound, gives undeniable preëminence to the photographic representation for purposes of exact research, but speaks of the still important mechanical difficulties in the way (*e.g.* the preparation of large plates; evenness of motion, etc.) which are however not insuperable. The reviewer must here remark, that he can only share Blake's views in so far as the photographic productions in the most favorable case may give a moderately true *flat image* of the sound figures, while their *plastic* representation can only be gained by the graphic method, assuming that we can find a foil or alloy suitable as a matrix.

Amongst the membranes applicable for phonographic experiments, the author regards the human *M. T.* as far superior to any artificial membrane, in spite of the alterations which it undergoes in preparation. Our sound-conducting apparatus likewise offers

the greatest perfection in the mechanical transfer of sound-waves Blake believes that he must give a negative answer to the question, whether all audible elements of speech are contained in the figures which the *M. T.* gives when used as a logograph, and cites as proof his experiments with the telephone, in which the photographed vibrations of the *receiving* plate of the telephone when compared with those of the *transmitting* plate, show the variations which result in the excursions of a telephone plate, when the magnet is switched off, or when it is in action.

Blake's papers give us an interesting insight into the manner in which, on the other side of the ocean, the representative investigators in physics, acoustics and otology unite in scientific research. It is indeed highly to be praised that the active mind of the Americans, which for the last ten years was principally directed to practical purposes, now cultivates theoretical acoustics with such success, and that thereby the German and English works are duly appreciated.

Stewart (5) in opening his paper speaks briefly of the sensitiveness of the sound-conducting apparatus, by virtue of which it is in a state to transfer vibrations of the slightest intensity; this sensitiveness standing in direct proportion to the inertia of the mass of the apparatus, or that when this is increased by alterations which have taken place in the sound-conducting apparatus, the loss thus resulting will be denoted by the proportional increase in the intensity of sound. Since the intensity of the sound is in inverse ratio to the square of the distance, the author calls the maximum distance, at which any given sound is perceived in undiminished sensibility of the sound-conducting apparatus, "Normal or Standard Distance," while the distance at which a deaf person perceives the same sound is called "Patient's Distance."

After some circumlocution Stewart comes to the following comparatively simple proposition. Assuming that a person of normal hearing begins to hear the ticking of a watch at 56 inches, and the patient the same watch at 24, then we have the ratio of hearing as follows: As 56 : 24 :: 100, d-h, i-e : 42.85 per cent. The sensibility, then, of the conducting apparatus will be shown by 42.85 per cent., and the loss by 57.15 per cent. A table could then be worked out for the same watch, so that the ratio could be easily read off at a glance. In order to avoid mistakes on the part of the patient, Stewart uses a "stop" watch; the same result, although less perfect, can be gained by turning the hand

which holds the watch, so that the hand comes between the watch and the patient's ear. The author moreover thinks that we should use a test-watch of 50 feet normal distance in case of great deafness, and then one of 10 feet, if the hearing improves; this would not alter the ratio, for $\frac{10}{50}$ and $\frac{1}{5}$ are the same as 20 per cent. Stewart then describes Politzer's audiometer, which, he says, is very suitable for testing high degrees of deafness, but its extreme normal distance prevents its being used in other cases. The reviewer regards Stewart's proposition to express the distance for the watch in per cent. as practical, because in this way otologists can easily come to mutual understanding for testing the hearing, but he cannot regard such mathematical exactitude (Stewart even uses a reckoning supported by logarithms) as suitable for testing with the watch, since it is well known that the ticking of a watch sounds decidedly weaker when the watch has been recently oiled.

Politzer's audiometer avoids just such sources of error, because it always offers the same normal distance. The reviewer finally cannot grant that this instrument is inapplicable for the slighter degrees of deafness, because every aurist, if he wishes to obtain exact, scientific, and trustworthy tests of hearing, must have a large space at command for whispers, which require a very great distance between the physician and the patient. We blame Stewart for leaving other tests of hearing unmentioned, since all investigators have recognized human speech, qualitatively and quantitatively applied, as the most exact test. Testing *with the watch alone* must in most cases lead to erroneous judgment of the disease.

The acoustic investigations of Preyer (6) are so extensive (66 octavo pages), that the reviewer must here confine himself essentially to drawing attention to the results that are of importance in physiology; he will, however, not neglect to recommend this excellent work to the particular attention of those specialists who interest themselves in the further development of physiological acoustics.

In an article which appeared in 1876,* Preyer had proved that the ear is capable of distinguishing as the lower limit of sound the tone of a tuning-fork with 24 vibrations per second. The question whether we could distinguish simple tones of a still less number of vibrations than 24, had then to remain an open one, because suitable

* Preyer Grenzen der Tonwahrnehmung. *Samml. physiol. Abhandlungen* von W. Preyer. Band i, Heft 1.

tuning-forks were not at hand. Preyer now succeeded, with the help of G. Appun, in Hanau, in obtaining two tuning-forks, the larger of which, 1 m. long, had about 13.7, the smaller, .70 m. long, about 18.6 vibrations in a second.*

By snapping these enormous forks with both hands, they could be set into extensive vibrations, which lasted about three minutes. If the ear were approached to the larger fork when in vibration, the single strokes of air could be distinctly *felt*, but nothing could be *heard* except a dull, interrupted breath, without any perception of a deep tone. The smaller fork gave, indeed, a distinct but interrupted humming sound, but here there was undoubtedly a dull sensation of sound, without roaring and rattling, the separate shocks of air beginning to blend, and becoming noticeably more frequent to the touch with the finger and to the auricle than those of the first fork.

Preyer caused a large number of people to observe both tuning-forks, and found a confirmation of his former assumption, that there are great variations as regards the blending of the infrequent shocks of air into one tone; there was namely no deepest tone of any single frequency, but every ear had its own especial lower limit of tone. But all observers agree that at least 16 vibrations per second are necessary for the production of a tone, since no one could unite the 13-4 vibrations of a single tuning-fork into a tone.

In order to remove the objection that the amplitude of the vibrations in the experimental forks is indeed very great, but warrants nothing as regards the inaudibility of the tone with still greater actual energy of the vibrations, Preyer provided the forks with sounding-boards, 6m. and 4½m. long respectively. The larger fork gave no tone when the ear approached the board, but only shocks, or a strong, intermittent breath or flowing; the smaller fork, on the contrary, produced in the air of the resonator a sweet, earnest, mild tone, something like subcontra D, which, like all the deepest tones, was, however, not continuous.

Preyer next mentions, for final removal of a doubt raised by Helmholtz (*Tonempfindungen*, 1877), a communication in writing from Alexander J. Ellis, in London, who, basing himself on experiments with the fundamental tone-apparatus, and counting the vibrations, has reached the same results as regards the lower limit

* The original paper has a misprint, reading: "The vibrations for the larger fork are about 18.6; for the smaller 13.7."—*Reviewer*.

of tone, viz.: that vibrations less than 15 per second give no tone.

In the second section, "Combination- and over-tones of tuning-forks," Preyer (induced by the publications of Vieth, Helmholtz and R. König) explains the difference between combination-, differential-, shock- and summation-tones, and draws the conclusion from his numerous experiments with very sensitive tuning-forks, that tuning-forks give rise to harmonious over-tones of considerable intensity, when they are sharply touched with the bow. His experiments have, on the contrary, won no support for the *objective* existence of differential tones; all observations show decidedly that these differential tones first originate in the ear itself, either in the *M.T.* or in the inner ear, as has been already assumed by many observers.

To explain the fact, that our ear is capable of separately perceiving at the same time a continuous tone, and beats of 24-130 shocks per second, the author argues that the beats which are blended into a tone, are perceived, like every other tone, only by the terminations of the auditory nerve in the cochlea, while, on the contrary, the roaring, buzzing, rattling, rolling, and unblended beats are perceived by other parts of the inner ear. It would thus become comprehensible how less than 16 shocks per second give no tone, but are heard individually, and how 24-130 disconnected beats produce the sensation of tones; since, then, the cochlea comes into coördinate action, and finally how more than about 130 shocks per minute can only be perceived by *the nerves of the cochlea*, and hence as a tone, since the *fibres of the vestibule* which are here concerned but not yet sufficiently studied, are provided with too sluggish a terminal apparatus. It might be here objected that the fibres of the auditory nerve, which *do not terminate in the cochlea*, have already been recognized by numerous experimenters as parts of the organ of the sense of equilibrium, but, on the one hand, if all disturbances of movement noticed after wounds of the semi-circular canals be also observed after wounds of the cerebellum; on the other hand, if the restoration of the acoustic function of the ampullar nerves be uncertain, the saccular nerves would still be at disposal to explain the rattling, rough and tremulous noises caused by 16-130 beats, the puffing tone of which is simultaneously perceived by the cochlea.

The reviewer is of the opinion that, although many new and

interesting points of view have been opened by these experiments, no exact proof for the cochlea theory has yet been gained. In section 3, "On the theory of consonants," the author, on the strength of numerous experiments with eleven tuning-forks of 1000-2000 vibrations, attacks Helmholtz's theory of consonants, which must undergo a formal and essential modification; finally, he confirms Hensen's statement, that about 16,384 terminal nerves are expanded in the cochlea.

In a "Notice on the perception of the smallest differences in the pitch of tones," Preyer says that none of his observers could distinguish 0.2 vibrations in any tone-color in the whole range of tones from the deepest to the highest, but that, on the contrary, an interval of 0.5 vibrations between 100-1000 could be accurately observed every time by those most practised.

Adolf Klünder (7) publishes a series of experiments *on the accuracy of the voice*, and in so doing touches also upon the question of the perception of the smallest differences of pitch. The determination of the error which the singer makes in striking a tone, rests upon the principle of *describing two tone-curves side by side*, and counting them. The apparatus employed consisted essentially of two tuneable membranes stretched over hollow cylinders. The membranes could be accurately tuned by pushing the edge of a second hollow cylinder by screw motion more or less forcibly against the membrane of the first cylinder. The correctness of the tuning is recognized by the co-vibration (sympathetic vibrations) of the membrane when its tone is sounded elsewhere. Fine aluminium styles are cemented to this membrane, and register the figured vibrations on a König's cylinder, covered with lamp-black. After the apparatus is so arranged, an organ pipe is sounded in front of one of the cylinders, while the observer sings the same tone into the other. The author concludes, from a long series of described curves, that a good voice can commit an error of $\frac{1}{3}$ vibration in every 100 vibrations. The author's ear distinguished in 100 vibrations differences in tone which could not be far from $\frac{1}{2}$ of a vibration, *i.e.*, 0.2; while Preyer, as we have just seen, grants only 0.5 to those most practised.

Hensen thinks, as physiologists insist on more accurate schooling of the voice, it is their affair to invent some apparatus to render possible an exact test of the results aimed at, and so describes (8) the following apparatus *to observe the pitch of a vocal tone*:

A König's capsule with burner is placed in front of a tuning-fork vibrating horizontally, and furnished with a mirror. A glass tube with india-rubber attachment is fixed to the air chamber of the capsule. The flame is either fixed in such a way that its image in the mirror is withdrawn from the singer, or so that he can watch it while singing. The tuning-fork being put now into motion, its tone, or its twelfth, octave, fifth, fourth or third are to be sung, and the image of the flame observed. If the tone is struck and held correctly, beautiful, regular images of the flame appear; the fundamental tone shows itself in the mirror in the form of a single flame, the octave gives two flames, the twelfth three, double octave four, etc., all of which stand perpendicular. If the tone is sung too low or too high, the image of the flame is restless, and the summits of the flames move forward or backward. Even a very low tone makes itself perceptible. The whole experiment rests upon the coördinate action of two periodical motions running at right angles to each other. The apparatus is easy to arrange, and therefore worthy of special recommendation to teachers of music practising at striking notes as well as pure intervals.

Fr. Koláčèk (9), induced by a paper of Felix Auerbach's, "Ueber die Tonhöhe einer Stimmgabel in einer compressiblen Flüssigkeit," [On the pitch of a tuning-fork in a compressible fluid], has experimented anew, and explains the fact that tuning-forks when struck in a fluid undergo a diminution in pitch, upon mechanical principles as follows: "The medium conducting the sound may be regarded as ballast, which the unaltered elastic forces of the tuning-fork, and of an inelastic source of sound in general, have to overcome. Hence ensues a lowering of pitch, when we ballast the fork with wax or a clamp. We can convince ourselves of this by sinking the fork vertically deeper and deeper into a fluid. The tone then becomes deeper and deeper in correspondence with the increase of ballast. If we dip but one arm into water, the tone is noticeably higher than when both are in the water. Also the nature of the source of tone is not immaterial, since e. g., the tone of a vibrating tuning-fork showed in water a lowering of 1.18 : 1; hence drinking-glasses when struck under water undergo a lowering of pitch greater than that of a small third." Koláčèk then draws up a formula in which the density of the water is taken as 1; from this formula, by the assistance of the known densities of other fluids, it can be

proved theoretically what lowering of pitch vibrating bodies will undergo in other fluids. The experiment always confirms the values thus determined, e. g., the lowering of pitch in quicksilver amounted to more than an octave; the density of water as compared with that of quicksilver is as $1:13\frac{1}{2}$. In commercial sulphuric acid, the lowering of pitch was $6:5$, *i.e.*, a small third; in ether and alcohol the pitch was also lowered, but varied only very slightly from what it was in water. Koláčèk's communications border very closely upon the physiology of the sound-conducting apparatus; at all events, to explain the perceptions of sound which take place in sound-conducting apparatuses under abnormal resistance by collections of fluid, the laws cited in his paper must be taken into consideration.

(10.) The instrument consists of two Leclanché elements, a microphonic key (tuning-fork) in union with the elements, two firmly fixed primary spirals and a secondary (induction) spiral, the ends of which are fixed to a telephone. The induction spiral can be pushed along a board graduated into 200 degrees. The firmly fixed right hand spiral has 6 *m.* wire, the left hand 100 *m.*

In testing the hearing, the secondary spiral is pushed along the graduated board, the number of units of hearing read off, the sound being made by the movement of the microphonic key between the battery and the primary wire.

At the distance of 200° , the maximum of intensity of tone, every one who is not absolutely deaf, hears the tone. On placing the secondary spiral at 0° , the tone is no longer heard through the telephone.

Hughes noticed the *sudden* cessation of perception of tone by the deaf, as well as by those of normal hearing, by a slight displacement, and Richardson could confirm this observation. Distinct hearing and perfect cessation of tone alternate by a push of 2° , *i.e.*, $\frac{1}{100}$ of the scale. The tone is heard longer when we push slowly, than when it is done with a jerk. In deep inspiration and when holding the breath, the hearing is somewhat increased.

Right-handed people hear better with the right ear, left-handed people with the left ear. The only exception was in the case of some physicians who were accustomed to auscultate with the left ear.

Richardson believes that when a disturbance of hearing has lasted for a long time, with e. g. defect in the *M. T.*, the memory for tones suffers, or their perceptibility decreases in the brain.

Hearing is influenced by atmospheric pressure, growing less when the pressure increases.

Richardson also uses the instrument through the mouth, to determine the acuteness of hearing when the tube is closed.

Richardson has tested the various substances from which artificial *M. T.* are made, and found gold the most suitable. Ash in Broad Street, makes gold cylinders for this purpose. They were shown on a patient. Richardson also communicates the discovery of a so-called "sphygmophone," without mentioning the German works on the same subject.

Lesser in the beginning of his article states that Winnett (11) in a paper on the state of the tympanum in the foetus and newly born, concludes, that where the accumulation of mucous tissue in the tympanum is met with in a marked degree, an energetic intra-uterine or post-partum respiration cannot have taken place, and that where it has disappeared without leaving distinct swelling, a forcible intra-uterine or post-partum respiration has taken place; and further, that the medium which is met with in the tympanum—air, liquor amnii, vaginal mucus, etc., was in front of the apertures for breathing during forcible respiration. Winnett says finally, "I regard the examination of the tympanum as fit within certain limits to take the place of the lung-test, in the case of the head of a foetus or new-born child found separated from the rest of the body."

While Nothmann agrees fully with these results, Blumenstock makes a few not immaterial restrictions, and Liman grants to the condition in the middle ear, *a supporting but indecisive significance*. All these views however rest on relatively slight experience. Lesser examined the middle ear of forty-two new-born children, thirteen of which were born dead, sixteen lived but a few minutes after birth, and thirteen from several hours to several days. He concludes: 1st. That still-born foetuses which have reached an age of seven months, have their tympana filled with fluid. 2d. The contents show no such perfect coincidence with the masses found in the air passages as to authorize the assumption that both originated from one source. 3d. The state of the middle ear is not altered by a few extra-uterine respirations. 4th. Air with fluid is only recognizable in the middle ear after several hours of respiration. The rapidity with which the fluid gives way to air, does not stand in a constant relation to the length of extra-uterine life. 5th. Intra-uterine respiration causes no alteration in the com-

position of the contents of the tympanum; mucous elements being found in the middle ear of apnoic as well as of syphilitic new-born children. The author after emphasizing Blumenstock's merit in having been the first to describe a case in which foreign substances like those in the bottom of a river into which a living child had fallen were found in the tympanum, protests expressly against his assertion, that an examination of the tympana might also furnish data as regards obstetrical malpractice, and then sums up the results of his investigations as follows: The examination of the tympana may demonstrate, though not in all cases,

1st. That a child died several hours after its birth. (In premature births the foetal condition of the middle ear may continue for more than twenty hours after birth).

2d. That the child was drowned (extra-uterine). (But the fluid in which the drowning took place is not always present in the tympana).

IV.* PATHOLOGY AND THERAPEUTICS OF THE ORGAN OF HEARING.

By DR. A. HARTMANN, BERLIN.

A. General.

1. Syphilitic affections of the ear, Dr. A. H. BUCK, New York. *Amer. Journal of Otology*, Jan., 1879.
2. Otitis intermittens. Dr. J. ORNE GREEN, Boston. *Ibid.*, April, 1879.
3. Two cases of gastric vertigo. Dr. RUSSELL. *Medical Times and Gazette*, March 8, 1879.
4. Reflexwirkung im Gebiete des Gehörorgans. (Reflex action in the region of the organ of hearing.) Dr. WEIL, Stuttgart. *Monats. für O.*, No. 5, 1879.
5. Ueber eine Verbesserung an meinern euen galvano-caustischen Batterie. (On an improvement in my new galvano-caustic battery.) Prof. VOLTOLINI, Breslau. *Ibid.* No. 3, 1879.
6. Ueber eine Verbesserung, etc. Idem. *Deutsche Med. Wochens.*, No. 2, 1879.
7. Der electriche Spiegel. Eine neue Beleuchtungsmethode von Körper-höhlen. (The electric mirror: a new method of illuminating the cavities of the body.) Dr. HEDINGER, Stuttgart. *Ibid.*, No. 7, 1879.
8. Bericht über die in der Zeit vom 20. Feb. bis 31. Dec. 1878, in meiner Poliklinik für Ohrenkranke beobachteten Krankheitsfälle. (Report, etc., of clinical cases of otology.) Dr. K. BÜRKNER, Göttingen. *Arch. für O.*, Band xiv, p. 186.
9. Hearing, and how to keep it. Dr. C. H. BURNETT. *American Health Primers.* Philadelphia, 1879.

* Section III., Embryology and Comparative Anatomy of the Ear, of which Prof. Löwe, of Bern, has made an excellent report, must, for want of space, be taken over to the next number.

10. De l'éducation des sourd-muets. (On the education of deaf-mutes.) M. COLDEFY. *Annal. des maladies de l'oreil.* Nos. 1 and 2, 1879.

11. De la responsabilité légale des sourd-muets. (A letter to Dr. Bonnafont.) Dr. LADREIT DE LACHARRIÈRE. *Ibid.* No. 1, 1879.

12. Neue Bahnen. Die Künstliche Lautsprache der Taubstummen als Beitrag zur Pathologie der Sprache. (New paths. The artificial phonetic speech of deaf-mutes, as a contribution to the pathology of speech.) Prof. KILIAN. Strasburg, 1879.

13. Internationale Statistik der Blinden, Taubstummen und Geistes-Kranken nach den neuesten Ermittlungen. (International statistics of the blind, deaf-mutes and insane, according to the latest census.) *Medicinal-Gesetzgebung. Zeitsch. für Medicinal., etc.* Polizei No. 9, 1879.

(1) Buck found thirty affections of a syphilitic nature amongst 4,000 ear cases, five of which, ulcers and cordylomata, affected the external ear. He divides the remaining cases into three classes: 1st. Those in which a pathological state of the middle ear explains the diminution of hearing, 7 cases. 2d. When a normal or nearly normal state of the middle ear exists, with which the existing deafness stands in apposition: affection of the acoustic nerve, 7 cases. 3d. When the middle ear shows infallible signs of pathological alterations which, however, do not suffice to explain the lack of hearing: middle ear and nerve affected, 11 cases. The author draws attention to the fact, that this sub-division is conventional, since an exact scientific division based on the pathological-anatomical state is at this time not possible.

While the syphilitic nature of the disease in affections of the external ear is easy to recognize by the characteristic behavior of the swelling, we possess no characteristic symptoms for disease of the middle and inner ears. In two cases, perforation of the *M. T.* had ensued without previous pressure from within, which will be regarded as an abnormal occurrence. Buck does not seem to have undertaken more accurate tests of hearing, especially by bone-conduction. As regards the pathological state in syphilitic diseases, the reviewer allows himself to draw the author's attention to Moos' paper on this topic. (*Virchow's Archiv*, Bd. lxi.)

(2) One of Orne Greene's female patients suffered regularly every evening from feverish symptoms, pain in the face, teeth and

head, and especially in the region of the ear. These neuralgic symptoms which affected only one half of the head, were accompanied with an inflammation and discharge of the ear on the same side. After a few hours, the patient fell into a perspiration and the symptoms disappeared. There was no malarial fever in the neighborhood, but the sanitary condition of the dwelling proved very unfavorable, so that the author assumes that the symptoms were occasioned by sewer gas. They improved of themselves, when the patient changed her residence.

(3.) In Russell's two cases, neither deafness nor tinnitus were present. The attacks of vertigo were single, came on after long pauses and were noteworthy in that the sensation of vertigo was present now in a lateral, now in a vertical direction. In the first case, the vertigo was caused by an ulcer of the stomach, while in the second it was impossible to decide whether the vertigo was of central or primarily gastric nature. In the first case, the single attacks were accompanied with loss of consciousness.

In a note, a patient of Dr. Mallet's is mentioned, in whom a single examination of the ext. aud. meat. always caused vomiting.

(4.) Weil still clings to the accuracy of his previously expressed view (see these *Archives*, vol. viii, part 2, p. 19) that the cessation of subjective sensations of sound by blowing into the ext. aud. meat., is due to reflex-action, and believes that it depends on reflex-contraction of the vessels. He says that in individuals in whom amyl-nitrite increased tinnitus, the noises ceased rapidly after blowing into the meatus.

(5 and 6.) Voltolini describes in both papers, an alteration in his previously described galvano-caustic battery (these *Archives*, vol. viii, part 3, page 193). While in the former arrangement, the 8 zinc-plates on the one side were united (chain) with the 8 carbon plates on the other, the present improvement consists in that each 4 carbon-plates can be united with 4 zinc plates (columns). By a simple switch-contrivance, the arrangement for columns or that for the chain can be used. The chain is most appropriate for the short and flat platina armatures, while long wires and porcelain burners attain the most intense heat by the column-arrangement.

The reviewer has obtained a new Voltolini battery, which has proved itself very suitable and convenient for minor and short operations; in operations of long duration it has always left him in the lurch. As the polarization is very strong, the intensity of

the current decreases rapidly. This can at first be obviated, by lifting and sinking the fluid-reservoir, but at last even this does not succeed, as the chromic acid decomposes rapidly. Voltolini himself mentions the possibility, that, during an operation, the action of the current may finally slacken, and recommends us then to refill the apparatus.

(7.) Hedinger's electric mirror consists of a hemispherical concave mirror, in which a platinum wire is brought to a white heat by the electric current, so that the space lying above the concave mirror is illuminated. Beneath the concave mirror is a moveable plain mirror, by means of which the illuminated cavities of the body can be viewed. Hedinger claims that the illuminating effect of the mirror with the battery as used by him, is much greater than that attainable by a Schalle's lamp.

(8.) Bürkner gives a statistical table of 217 ear cases, the more interesting of which shall be published elsewhere.

(9.) Burnett's small monograph (145 pages) purports to give a popular representation of the hygienic rules needful for the preservation of good hearing. The work is very judiciously written, and the popular and unsuitable methods of treating diseases of the ear are especially found fault with.

(10.) Coldefy describes the education of deaf-mutes from his standpoint as professor in the deaf-mute institute in Paris. As visible speech is not taught at this institute, the author's views differ materially from those which prevail outside of Paris. It would lead us too far here to discuss the advantages and disadvantages of instruction by visible speech or gestures, and so we confine ourselves to a few corrections in point of actual fact.

When the author affirms that after the Abbé de l'Epée had first educated deaf-mutes in Paris, delegates hastened thither from all parts of the world to learn his method of instruction, and after their return instructed in this method, this is only partially correct. In both England and Germany, at that same period, Braidwood in Edinburg (1760), and Heinicke in Eppendorf (1768-1778), and later in Leipzig, laid the foundations for the public instruction of deaf-mutes, and instruction was given in both countries in visible speech, quite different from the Abbé's method. This method has since taken root in most other countries. Further on, the author expresses the view that in a large number of German institutes, visible speech no longer plays the essential part in the education of congenital deaf-mutes. This

is incorrect, since, far more than ever, in the last ten years, in Germany, Switzerland and Austria, are deaf-mutes educated almost exclusively by visible speech. We also beg to remind Mr. Coldefy that visible speech has lately been introduced into France, and used in several institutes. (Vid. *Comptes Rend.*, No. 18, page 1045, 1876; *Lyon Méd.*, Feb., 1875; *Gazette des Hôpitaux.*, August, 1874). In Holland, it seems that at Grœningen the French method was once used, but that now the so-called German method, or visible speech, has completely superseded it. (Comp. *Report of the Brussel's Med. Congress in Arch. für Ohren.* Band x.)

Coldefy's description of the intellectual cultivation of deaf-mutes is very carefully and exactly done.

(11.) After Bonnafant had expressed the opinion, that the intelligence of deaf-mutes, with few exceptions, is incapable of a satisfactory development, so as to make them legally responsible for their deeds, Ladreit de Lacharrière emphasizes the fact that this view stands in opposition with all the experience of deaf-mute teachers, as well as with the accomplishments which deaf-mutes have to show in various callings. If we might perhaps assume in the case of *congenital* deaf-mutes that they stand on a lower level, there is no reason why we should doubt the intellectual foundation and capacity for development in deaf-mutes with *acquired* deafness. The author mentions examples of remarkable intellectual development in deaf-mutes, as well as deaf and blind people without instruction.

Finally, the author discusses deaf-mutes in a moral point of view, as regards their responsibility in case of crime. He rightfully rejects the opinion, spread abroad even in Germany, that deaf-mutes are violent, passionate, and rash, and points out the fact, that these peculiarities, even if present, are only due to defective instruction. We must attribute responsibility in crime to deaf-mutes, who can either write or express themselves by gesture.

(12.) Kilian, the Strasburg teacher of deaf-mutes, ventures in his brochure upon medical provinces, and advances a number of hazardous theories. We may quote the introduction, to characterize the paper, "The inability to speak, or aphasia, of deaf-mutes, is not only a mechanical impediment in the motor channel of the centre of phonation, nor a pure morbid disturbances of the intracortical region of the brain," etc.

(13.) From official figures we take the following data concerning deaf-mutes :

ABSOLUTE NUMBER.

Countries.	Year of Census	Male.	Fe- male.	Total.	Ratio to every 10,000 Inhabitants.
A.—GERMANY.					
1. Prussia	1871	12,736	10,843	23,579	9.6
2. Bavaria	1871	2,236	2,112	4,348	9.0
3. Württemberg	1861	1,019	891	1,910	11.1
4. Saxony	1871	885	799	1,684	6.7
5. Baden	1871	942	812	1,754	12.2
6. Mecklenburg-Schwerin	—	—	—	—	—
7. Mecklenburg-Strelitz	—	—	—	—	—
8. Hesse	1867	—	—	883	10.7
9. Oldenburg	1875	124	95	219	6.9
10. Saxe-Weimar	1871	178	173	351	12.3
11. Saxe-Altenburg	1871	53	41	94	6.6
12. Schwarzburg-Rudolstadt	1871	49	34	83	11.0
13. Schwarzburg-Sondershausen	1871	26	25	51	7.6
14. Reuss : younger branch	1871	40	33	73	8.2
15. Reuss : older branch	1871	12	22	34	7.5
16. Brunswick	1871	98	90	188	6.0
17. Saxe-Meinigen	1875	125	130	255	13.1
18. Anhalt	1871	68	56	124	6.1
19. Saxe-Coburg-Gotha	1871	84	82	166	9.5
20. Lippe-Detmold	1871	—	—	65	5.8
21. Waldeck-Pyrmont	1871	34	26	60	10.7
22. Schaumburg-Lippe	—	—	—	—	—
23. Hamburg	1867	72	51	123	4.0
24. Lübec	1871	28	9	37	7.1
25. Bremen	1871	49	29	78	6.4
26. Alsace-Lorraine	1871	977	747	1,724	11.1
B.—FOREIGN COUNTRIES.					
1. Belgium	1858	1,134	855	1,989	4.4
2. Denmark	1870	587	511	1,098	6.2
3. England and Wales	1871	6,262	5,256	11,518	5.1
4. Finland	—	—	—	—	—
5. France	1872	12,723	9,987	22,610	6.3
6. Ireland	1871	2,461	2,006	4,467	8.3
7. Italy, (without the Campagna).	1871	10,589	7,487	18,076	7.5
8. Netherlands	1869	629	570	1,199	3.4
9. Norway	1865	820	749	1,569	9.2
10. Austria	1869	—	—	19,701	9.7
11. Russia	—	—	—	—	—
12. Sweden	1870	2,379	1,887	4,266	10.2
13. Switzerland	1870	—	—	6,541	24.5
14. Spain	1871	5,806	4,054	9,860	5.9
15. United States of America	1870	8,916	7,289	16,205	4.2

B. External Ear.

14. Ein Fall von Verschlussung des äusseren Gehörganges und Verlust des Gehörs durch Exostosen-bildung, complicirt mit acuter profuser Mittelohrentzündung. (A case of closure of the

ext. aud. meat., and loss of hearing from the formation of exostoses, etc.) Dr. S. MOOS, Heidelberg. *These Archives*, vol. viii, 3, 225.

15. Ueber Bindegewebsstrangbildung mitten im äusseren Gehörgang. (On the formation of connective-tissue cords in the middle of the ext. aud. meat.) Dr. A. BING, Vienna. *Wien. Med. Blätter*, Nos. 22 and 23, 1879.

16. The use of calcium-sulphide in the treatment of inflammations of the ext. aud. meat. Dr. SAMUEL SEXTON, New York. *American Journal of Otology*. January, 1879.

17. Condylomata of both ext. aud. meat. Dr. H. KNAPP, New York. *These Archives*, vol. viii, 2, page 165.

18. Twenty cases of growth of aspergillus in the living human ear. Dr. C. H. BURNETT, Philadelphia. *American Journal of Otology*, January and April, 1879.

19. On a possible source of error in the diagnosis of fungus in the ear. Dr. E. CRESWELL BABER. *Brit. Med. Journal*, March 22, 1879.

20. On behandlingen of exostose in øregangen. (On the treatment of exostoses in the ext. aud. meat.) Dr. V. BREMER, Copenhagen. *Hospitals-Sidende*, No. 2, 1879.

21. Ein Fall von primärem Epithelial-Krebs, etc. By Delstauche. (A case of primary epithelial cancer, etc.) See *above*; Report on pathological anatomy.

22. Ueber ein traumatisches wanderndes Hæmatom des Trommelfells. (On a traumatic movable hæmatoma of the *M. T.*) Dr. S. MOOS, Heidelberg. *These Archives*, vol. viii, 4 p 332.

23. Tinnitus Aurium from tension of the *M. T.* Relieved by incision. Dr. R. TORRANCE, New Castle. *Brit. Med. Journal*, May 10, 1879.

15. Violent inflammation, with swelling of the region of the ear, followed the removal of an aural polypus in one of Bing's patients. A subsequent examination revealed two granulations in the ext. aud. meat., one of which projected from the upper wall, the other from the lower wall, into the lumen of the meatus. They soon approached and united into a pale-red, and firm cord. A cure was gained by cutting the cord, and touching the cut surfaces with Liq. Ferr. Sesqui-chloridi.

16. Sexton recommends the internal exhibition (in the first decimal trituration !) of calcium-sulphide, in otitis externa.

18. Burnett introduces his paper with a very complete review

of previous observations of the formation of aspergillus in the ear, and publishes in detail the clinical history of twenty cases under his own observation, which contain many interesting points; the conclusions of the author being all that our limits allow us to notice.

Etiologically, the disease is not one of poverty and filth especially, for seventeen of the twenty cases were seen amongst the better classes. The chief cause is unnecessary picking and scratching of the ear, as well as the instillation of oily or fatty substances (Bezold), and finally the neglect to cleanse the ear after furuncles and inflammation.

The treatment consists in removal by the syringe and wads of cotton. In destroying the fungus, Burnett employs pure alcohol, or subsulph of soda: 0.1:20.0 aq. destill.; the latter especially for the patient's own use.

19. Creswell Baber, when syringing ears, found in the out-flowing water some blackish masses, which on microscopic examination revealed the mycelium and spores of a fungus. This state became so frequent that he was led to examine his syringe more carefully, and found on the piston a gelatinous looking substance, in which blackish-brown masses were imbedded. The fungi in these masses resembled so precisely those found in the water flowing from the ear, that there could be no doubt but that they originated from the syringe. Practically, Baber concludes, that we should examine our syringe if there be suspicion of fungoid growths in the ear; and also examine the syringe from time to time for fungi.

20. Bremer's report, published also in *Annales des Mal de l'oreille*, has already been mentioned. These *Archives*, viii, 3, 295.

21. Steinbrügge's report is referred to elsewhere, as a purely pathologico-anatomical paper.

22. Torrance communicates a case in which he gained decided relief from noises in the ear, and improvement of deafness, by incising the *M. T.* behind the handle of the hammer. The application of Siegle's speculum produced a normal condition of the *M. T.*

C. Middle and Inner Ear.

23. On primary acute purulent inflammation of the middle ear. Dr. H. KNAPP. These *Archives*, viii, 1.

24. Two cases of tympanic vascular tumor with a pulsating intact drum-membrane. Dr. R. T. WEIR, New York. *Amer. Journal of Otology*, April, 1879.
25. A case of intra-tympanic vascular growth with intact *M. T.* Dr. A. H. BUCK. *Ibid.*, April, 1879.
26. Ueber einen Fall von Catarrh der Eustachischen Ohrtrompete mit Hirnsymptomen. (On a case of Catarrh of the Eustachian tube with brain-symptoms.) Dr. K. BÜRKNER, Göttingen. *Berl. Klin. Wochenschr.*, No. 11, 1879.
27. Ueber den Einfluss der Facialislähmung auf die Binnenmuskeln des Ohres. (On the influence of paralysis of the facial nerve on the inner muscles of the ear.) Dr. M. BERNHARDT, Berlin. *Ibid.*, No. 16, 1879.
28. Eine Modification der Ballonluft douche. (A modification of the air-bag-douche.) Dr. A. OTT, Luzerne. *Arch. für O.*, Band xiv, 186.
29. Ein Instrument zur Entfernung von Flüssigkeiten aus der Paukenhöhle. (An instrument for the removal of fluids from the tympanum. Dr. R. SCHALLE, Hamburg. *These Archives*, vol. viii, 3, page 215.
30. Zur Behandlung der Mittelohreiterungen. (On the treatment of purulent inflammations of the middle ear.) Dr. BECKER, Dresden. *Monats. für Chren.*, No. 8, 1879.
32. Die antiseptische Behandlung einiger Ohrenkrankheiten. (The antiseptic treatment of some ear diseases.) Dr. G. KÜHN. *Deutsche Med. Wochenschr.*, Nos. 15 and 16, 1879.
33. Zur antiseptischen Behandlung der Mittelohreiterungen. (On the antiseptic treatment of purulent inflammation of the middle ear.) Dr. BEZOLD, Munich. *Arch. für O.*, xv, 1.
34. Operatives Verfahren bei Ohrpolypen. (Operative treatment of aural polypi.) Dr. A. POLITZER, Vienna. *Wien. Med. Wochenschr.*, No. 16 *et seq.*, 1879.
- 34 (a). Cases of interest, etc., at the Cork South Infirmary. H. MACNAUGHTON JONES, M.D. *Lancet*, May 24, 1879.
35. Ein Seltener Fall von acutem eitrigem Mittelohrcatarrh. Knochenlücke in der Fossa jugularis. (A rare case of acute purulent inflammation of the middle ear. Bone-fissure in the jugular fossa.) Dr. C. KATZ, Berlin. *Berl. Klin. Wochenschr.*, No. 11, 1879.
36. Ueber Sinusthrombose, Meningitis, Kleinhirn-Abscess nach Otitis media. See Dr. Steinbrügge's Report. Dr. R.

KRETSCHY, Vienna. *Wien. Med. Wochensch.*, Nos. 11 and 12, 1879.

37. Purulent inflammation of the middle ear. Caries of the mastoid process. Erosion of the veins at the base of the skull. Embolic abscesses of the lungs, etc. CORNELIUS WILLIAMS, M.D., New York. *Arch. O. and O.*, vol. vii, 1, 73.

38. Beiträge zur Pathologie and pathologischen Anatomie des Ohres. (See Dr. Steinbrügge's Report.) Dr. BURKHARDT-MERIAN, Basel. *Arch. für O.*, Band xiv, 175.

39. Four cases of severe disease of the mastoid process. Dr. S. MOOS, Heidelberg. *These Archives*, vol. viii, 3, 231.

40. On sclerosis of the mastoid process. Dr. A. HARTMANN, Berlin. *These Archives*, vol. viii, 4, page 322.

41. Ueber die chirurg. Eröffnung des Warzenfortsatzes. (On the surgical opening of the mastoid process.) Dr. H. SCHWARTZE. Conclusion, *Arch. für O.*, Band xiv, 202.

42. Des Abscès mastoïdiens liés aux affections de l'oreille. (Mastoid abscesses in connection with diseases of the ear.) Dr. H. GERVAIS, Paris, 1879.

43. Ein neues Verfahren zur Eröffnung des Warzenfortsatzes. (A new method for opening the mastoid process.) Dr. BOGROFF, Odessa. *Monats. für O.*, No. 5, 1879.

44. Disease of the mastoid bone. Lecture by DALBY before the Royal Med. and Chirurgical Society. *Lancet*, January 18, 1879.

45. Deafness from a blow on the mastoid process. Cure following accidental epistaxis. Dr. R. ELLIS, Newcastle. *Brit. Med. Jour.*, June 14, 1879.

46. Schläfenheinfissuren. (Fissures of the temporal bone.) ZAUFAL, Prague. *Prag. Med. Wochensch.*, No. 8, 1879.

(25). In Weirs' first case, the *M. T.* was very dark red, the whole membrane bulged forward, the hammer visible in a furrow, and the membrane showing a distinctly visible, marked pulsation, synchronous with the pulse. This pulsation could be reduced by compression of the carotid. Weir believed that this was a case of collection of bloody serum, and so performed paracentesis. The subsequent profuse hemorrhage was checked by tampons of cotton. The air-douche did not succeed. The paracentesis was repeated several times, the growth destroyed by nitric acid, and a cure gained, with improvement of hearing.

The second case was that of a female patient, who was very

much annoyed with rhythmical noises on the left side of the head, synchronous with the pulse. Examination showed the posterior and lower surface of the *M. T.* reddened, bulging and pulsating. Considerable hemorrhage followed the paracentesis, which was repeated several times. Chromic acid solution 1:7, was used as a caustic through the perforation-opening with decided improvement. The treatment could not be followed out to the end.

26. A female patient of Buck's also had tinnitus, synchronous with the pulse. Examination showed the whole lower half of *M. T.* of a vivid red. Two years later the whole posterior half of the *M. T.* was convex and pulsating. Buck accentuates the origin of the growth without demonstrable cause, its vascular character and the slow development.

27. Bürkner describes the case of a servant girl with very violent tinnitus, excessive headache, feeling of heat, and giddiness, following an acute cold in the heat. These symptoms were so marked that the case seemed one of cerebral disease. The deafness was very great, but bone-conduction for sound was preserved. Both *M. T. T.* were very concave. The air-douche with the catheter was very unsatisfactory at first. With increased permeability of the tubes the symptoms gradually improved. (Politzer's method does not seem to have been used.)

28. Hitzig once communicated a case in which, with extreme facial paralysis, without participation of the uvula, there was a disturbance of taste on the affected side, abnormal acuteness of hearing for all deep tones (explained by Lucae as due to increased labyrinth-pressure with paralysed stapedius muscle, and uncompensated action of the tensor tympani), and a deep tone (contraction of the stapedius) heard by the patient at every attempt at motion with the frontalis. Bernhardt now publishes a case of equally marked facial paralysis, without paralysis of the uvula, without disturbance of taste, without hyperacusis. When attempting to close the eyes or to whistle, a low buzzing was heard in the ear. Bernhardt believes, therefore, that no especial value attaches to the symptoms in so far as refers to a diagnosis of the seat of the facial paralysis. It may be present or absent when hyperacusis (paralysis of the stapedius) exists, and so also when there is no hyperacusis.

29. In order to avoid removing the bag during catheterization, Ott uses a bag with two openings, from one of which a rubber tube leads to the catheter, while the tube running from the second

is held in the operator's mouth. This tube between the teeth is to be pressed together or not, depending upon whether air is to enter the bag or not. The teeth, therefore, are to take the place of the valves in air-bags used for the same purpose.

31. Becker believes that he has discovered a new cleansing method in purulent inflammation of the middle ear, which fulfills most satisfactorily all the purposes aimed at by syringing, without possessing its accompanying dangers. Amongst the latter are mentioned, the commingling of the injected fluid with the pus in the sinuses and cavities of the ear rather excites than diminishes the secretion, and besides this, syringing is inconvenient, and sometimes really dangerous. Becker has most rigorously avoided syringing in more than 300 cases, and cleansed the ear daily by a dry process, wiping it out and drying it carefully with small tampons of wadding held with bent forceps. This treatment has never failed the author, and he recommends it also for diseases of the ext. aud. meat.

32. Kühn describes the method used at the Greifswald surgical clinique in treating purulent inflammation of the middle ear, which consists in transferring the antiseptic principles of the general treatment of wounds to the inflammatory processes of the organ of hearing. The method consists in first cleansing the meatus, then filling it with a one per cent. solution of salicin, and preventing the escape of the fluid by a closely-fitting cotton plug, so that the causes of irritation and inflammation shall be destroyed and prevented. The method was employed in 125 cases with the best results, and is especially to be recommended in carious processes of the mastoid process.

33. There are two circumstances which, in Bezold's opinion, might cause the antiseptic treatment of purulent inflammation of the middle ear to appear illusory, viz., the impossibility of complete disinfection of all the sinuses of the middle ear, and the impossibility of perfect exclusion of air, since the tympana are connected with the air in the naso-pharyngeal space by the tubes. Besold resorted then to a long series of cases to decide the question.

After using carbolic acid, salicylic acid and thymol, he tried boracic acid, and reports on the extremely favorable results gained with the last remedy. The treatment is as follows:

(a.) The meatus and tympana are cleansed with a saturated four per cent. solution of boracic acid. (Pure water was also used without any detriment;)

(b.) After careful wiping dry and use of the air douche, finely pulverized boracic acid is blown in and poured in.

(c.) The ext. aud. meat. is filled with salicylic, carbolic or boracic lint.

Twenty-nine cases of acute purulent inflammation of the middle ear were so treated, and the average length of cure was thirteen days. A very favorable result was also gained in acute inflammation of the middle ear in typhus fever.

One hundred and sixteen cases of otitis media purulenta chronica were treated, the average duration being nineteen days. Three forms of this disease offered resistance to the antiseptic treatment: (1.) Those complicated with destructive bone disease. (2.) Those forms developed during advanced disease of the lungs; and (3.) The purulent inflammation of the upper part of the drum cavity with perforation of Shrapnell's membrane. Seven cases of the latter disease are described in detail.

Finely pulverized boracic acid exercises neither a mechanical nor chemical irritation upon the mucous membrane of the middle ear, nor do we find those firm and tenacious masses so difficult to remove as when pulverized alum has been used. The reviewer has had an opportunity of convincing himself in a large number of cases of the extremely favorable action of insufflations of boracic acid, especially in *chronic* purulent inflammation of the middle ear, while in the *acute* form repeated relapses followed the application of the powder.

34. In order to decide whether a polypus springs from the ext. aud. meat., or from the tympanum, Politzer employs a probe-pointed, winged sound, bent at right angles, and marked off for every 5 mm. When the sound is pushed in, the polypus is embraced; if we meet with a resistance at a depth less than the distance of the orifice of the meatus from the *M. T.*, we can assume it to be due to the root of a polypus. Polypi which spring from the ext. aud. meat. can be torn out with the snare, and so removed radically. All methods of extraction are rejected in the case of large polypi, the origin of which cannot be determined; such polypi must be removed, with the snare that is cut through. In the case of fibrous polypi, those snares in which the noose can be withdrawn into the tube (Hartmann), are preferable to those in which there is an intervening bridge at the end (Wilde, Blake). As a radical removal cannot be gained by abscision, Politzer devised for this purpose a new instrument, which consists of a con-

cave-convex ring, the inner edge of which is cutting. The diameter of the ring for larger growths measures $3-3\frac{1}{2}$ mm., for the smaller and when the meatus is small, 2 mm. For polypi which spring from recesses, the ring-knife is to be placed at an obtuse angle to its axis. Politzer used this instrument in eighty-two cases, and the removal of the polypus succeeded quicker and more radically than with the wire snare. He uses a small drop of liq. ferri. sesqui-chl. upon a sound, to remove the remains of polypi, and destroys them thus with less pain and more surely than by the use of lunar caustic.

34a. Prof. H. Macnaughton Jones communicates at the close of his lecture, the operation of three aural polypi (fibroid, fibro-gelatinous and vascular), with Wilde's snare and Toynbee's forceps. He cleanses the ear with cotton fixed to a probe, and uses this also to apply chloro-acetic acid for the destruction of the remains of the polypus. ("Nothing of special interest has occurred in the aural department!")

35. Katz observed in the case of a girl æt. 9, with acute perforative inflammation of the middle ear, that pressure on the jugular vein evacuated pus very rapidly from the perforation-opening. The flow ceased when the pressure was stopped. Katz regards it as very probable, that a dehiscence in the floor of the tympanum was the cause of this occurrence. (?)

36. Kretschy reports three cases of brain disease due to otitis media. These correspond to three accompanying morbid processes, (thrombosis of the sinus, meningitis, and formation of abscess.)

In the first case, where the autopsy revealed the formation of cholesteatoma and thrombosis of the sinus, stiffness of the neck, violent headache, sinking of the abdomen, and high fever ensued on the ninth day, after being preceded by violent headache and feverishness. Chills with profuse perspiration and excessive tenderness about the neck when gentle pressure was made near the jugular vein, appeared on the following day. No hardness could be demonstrated in the vein. Pyæmic symptoms followed. As the sensitiveness remained confined to one side of the neck, and did not follow down to the extremities and trunk, and as peripheral paralytic symptoms were absent, a basilar meningitis could be excluded.

In the second case, in the course of a left-sided purulent otitis, typhus abdominalis appeared and led to convulsions, trismus and

coma. Contraction of the neck, paralysis of the left facialis as well as of the upper and lower extremities preceded death. The autopsy showed meningitis of the convexity, and the hemiplegic symptoms were explained by the seat of the meningitis over those convolutions of the brain, which lie directly above the cerebral ganglia.

In the third case there was constant pain during life at a circumscribed spot at the occiput. The head was held stiffly, as all its motions caused pain, and there was remarkable apathy on the part of the patient. The fever symptoms were but slight, and death ensued in a comatose condition.

The diagnosis of abscess in the cerebellum was based chiefly on the constant local pain in the occiput.

The pathologico-anatomical conditions have been previously described in this report.

41. Schwartze's paper, now lying before us, closes the previously communicated series, embracing fifty cases, in which Schwartze undertook a surgical opening of the mastoid process. Thirty-five of these cases were cured; five remained uncured, and ten died. Death was independent of the operation in six cases; in three the connection was doubtful, and in one death was due to the operation. The average duration of treatment was 9-10 months.

According to Schwartze, the indications for the operation are as follows: (1.) Acute inflammation of the mastoid process, with retention of pus in the bone-cells, with continuous œdematous swelling, pain and fever. Under these conditions the operation was performed eleven times. (2.) When repeated swelling of the mastoid region ensues, even when the symptoms do not threaten life; when sub-acute abscesses or fistulæ are present at the mastoid process; 25 cases. (3.) When the mastoid process is sound externally, but with bulging of the skin in the posterior upper wall of the meatus, and retention of pus in the middle ear. (Pain, fever, offensive pus.) Eleven cases were thus operated on, and three were done to save life if possible.

When a fistula is present, the operation consists in enlarging it with the grooved probe or chisel, and scraping out the softened bone with the spoon. Schwartze recommends the gouge for opening the healthy process, and that the entrance into the canal should be on a level with the ext. aud. meat. While he formerly recommended to penetrate $\frac{1}{4}$ - $\frac{1}{2}$ inch behind the auricle, and

to push the periosteum $1\frac{1}{2}$ cm. still further back, he seems to have convinced himself that this is unsuitable and dangerous, and now advises to penetrate "somewhat behind the auricle." He then withdraws his previous views of penetrating as deeply as 3 cm. and more, in case of sclerosis, and announces now that we should not penetrate deeper than 2.5 cm.

Schwartzke speaks most sharply against the use of drills, since we then "drill into the darkness," and finds it "wholly incomprehensible" why the reviewer "advises the drill." On this point the reviewer refers to these *Archives*, vol. viii, page 330, and confines himself merely to pointing out that at the end of the paper in the collection of instruments used by Schwartzke one can see, "a hand-drill, with six drill-points," etc. At the time when Schwartzke began to perform the operation, "the necessary anatomical knowledge and surgical experience were wanting." (*Arch. fur O.*, Band x. 28), and the sinus was opened by erroneous procedure. When we become well acquainted with the anatomical relations, many things will be illumined that are now dark to us. Esmarch has operated with the drill with the best results, and has not been able to confirm the experience of which Schwartzke speaks, that we have a disproportionally frequent erysipelas of the wound and violent absorption-fevers after using the drill.

According to Schwartzke, the removal of the posterior wall of the meatus is highly to be recommended in many cases. The opening of the antrum from the meatus outward is rejected.* The very tedious and wearisome after-treatment consists in irrigations twice or thrice daily with a $\frac{3}{4}$ per cent. chlor. sod. solut., with 1 to 2 per cent. carbolic acid water. The canal is often kept open by a leaden nail.

42. Gervais' very detailed thesis is divided into anatomical considerations, descriptions and treatment of mastoid abscesses. He distinguishes intra- and extra-mastoideal abscesses, and divides the latter again into those situated beneath the skin, and those beneath the periosteum. While

* I mentioned in the *Berl. Klin. Wochenschr.*, No. 33, 1876, that "I had undertaken on the cadaver to open the antrum from the meatus," and there pointed out that in this way we are able to open the antrum from two sides, and "can resort to the one or the other, depending upon the circumstances." Schwartzke now represents that I (*l. c.*) had proposed "regularly to unite the opening of the antrum from the outer surface of the mastoid process, with the opening of the antrum from the external aud. meat." It is this proposition which seems objectionable to Schwartzke.

the former, according to Hagen, are frequently connected with furuncle or formation of abscess of the posterior wall of the ext. aud. meat., the latter are usually associated with purulent inflammation of the middle ear. Two cases are mentioned, in which ocular disturbances were associated with the formation of abscess on the mastoid process, strabismus internus on the affected side in one, and contraction of the pupil in the other case. These symptoms disappeared after the abscess was opened. Gervais believes that they must be regarded as reflex symptoms, communicated through the nerves of the dura mater.

Intra-mastoideal abscesses, *i.e.*, collections of pus in the mastoid process, are next described. Amongst the complications, thrombosis of the sinus is less frequent than meningitis and abscess of the brain; the cerebellum is more rarely affected than the cerebrum. The opinion that collections of pus in the mastoid process of children are rather rare, can hardly be correct. Gervais explains this from the fact that in children the cavities of the mastoid process communicate with the tympanum only from the fifth year onward, which, at all events, is erroneous. In case of continuous pain, swelling, and redness of the mastoid process, Wilde's incision is recommended; if no improvement ensues within 24-48 hours, the mast. proc. is to be opened. Tillaux (Gervais' teacher) uses the hammer and chisel for this purpose. The section in the skin is T-shaped. The author, following Désarènes, prefers as boundary mark of the operation the spina supra meatum or the small furrow which is found at the root of the zygomatic bone. (Since the greater the development of the furrow the more marked the prominence of the spina, there could hardly be any decided difference between the use of both spots as boundaries.—*Reviewer.*)

Seventeen cases belonging to the various forms of abscess are described in detail.

43. Bogroff proposes, *on entirely theoretical grounds, however*, to open the mast. proc. by successive cauterization of the bone with the galvano-caustery.

44. Dalby reports on a case of epithelioma, which had originated from the tympanum after a purulent inflammation of the middle ear, which had lasted a long time. The mast. proc., the ext. aud. meat., and a part of the petrous bone were destroyed.

45. A boy of 14 received a blow on the mast. proc. of the right temporal bone. The patient recovered but very slowly from

the concussion of the brain that ensued. Deafness, tinnitus and vertigo continued, as well as a dull feeling of pressure in the head. Ellis succeeded in removing the tinnitus and vertigo, after a treatment of twelve weeks. The deafness and head symptoms did not disappear until the patient had accidental and profuse bleeding from the nose.

46. Zaufal shows by a preparation that the course of the fissures of the temporal bone follows certain paths, which are determined by the anatomical relations of the temporal bone. The most frequent fissure is that which begins at the anterior surface of the pyramid, runs from the summit into the sulcus ad hiatum canalis Fallopiæ, touches the gl. geniculi, runs over the tegmen tympani, and passes through the anterior and posterior walls of the osseous ext. aud. meat., at the place where the upper wall of the pars tympanica separates itself from the squamous substance and the mast. proc. We sometimes find a rupture at the spot where the upper edge of the *M. T.* inserts itself into the innermost edge of the lower plate of the horizontal portion of the squamous bone without any other rupture of the drum-skin. Such a preparation was shown. The arterial hemorrhages originate from the middle meningeal artery.

In a patient who remained alive, a similar course of the fissure could be diagnosed from the state of the parts and the existing symptoms. On examining the ext. aud. meat., a furrow was found on the posterior wall, running from without inward to Shrapnell's membrane. The deafness was total, even for bone conduction. Swelling of the conjunctiva and eyelids; facial paralysis and anæsthesia of the cheek and upper lip existed after the injury. The sense of taste was absent on the right tip of the tongue, but there was no defect of motion in the soft plate. The diagnosis was made, that the facialis had been wounded just behind the gl. genic., that is to say after the branching of the n. petr. superfic. major, but before that of the chorda tympani. The conclusion of a continuation of the fissure into the cranial cavity, through the anterior surface of the pyramid, was drawn from the facial anæsthesia, and the symptoms on the part of the eye.

D. Nose and Naso-Pharyngeal Space.

47. Ueber partielle und totale Verlegung der Nase. (On partial and total closure of the nose.) Dr. ZIEM, Danzig. *Monats. fur O.*, No. 1, et seq., 1879.

48. Die Rhinoscopie und Pharyngoscopie. Prof. R. VOLTOLINI, Breslau. 2te Auflage. 1 Hälfte Verlag von E. Morgenstern, Breslau, 1879.

49. Adenoid polypi on the nasal septum. Dr. JACOBSON. *Brit. Med. Journ.*, March 1, 1879.

50. Ueber die Behandlung der adenoiden Vegetationen im Nasensachenraum. (On the treatment of adenoid vegetations in the naso-pharyngeal space.) Dr. G. GATTI, Vienna. *Monats. fur. O.*, Nos. 1 and 2, 1879.

51. Die rhinoscopischen Untersuchungs- und Operations-Methoden. (Methods of rhinoscopic examination and operations.) Dr. B. BAGINSKY, Berlin. *Volkman's Samml. Klin. Vortrage*, No 160.

52. Ueber ein neues Instrument zur Entfernung der adenoiden Vegetationen im Nasenrachenraume. (On a new instrument for removing adenoid vegetations in the naso-pharyngeal space.) Dr. DELSTANCHE, Brussels. Translated by Dr. Blau. *Arch. fur O.*, Band. xv, pag. 35.

53. Du catarrh nasal chronique et de l'ozène, de leur traitement, etc. Dr. EMILE TILLOT. *Annal. des mal de l'oreille*, Nos. 1 and 2, 1879.

54. Ueber Inhalation des Oleum Eucalypti bei Rachendiphtherie. (On the inhalation of oleum eucalypti in pharyngeal diphtheria.) Prof. MOSLER, Greifswald. *Berl. Klin. Wochensch.*, No. 21, 1879.

55. Die Plica salpingopharyngea. (The salpingo-pharyngeal fold.) Preliminary communication by Prof. E. ZAUFAL, Prague. *Frag. Med. Wochensch.*, No. 22, 1879.

56. Zusatz zu der vorläufigen Mittheilungen Die Plica, etc. (Supplement to No. 55.) *Idem, Ibid.*, No. 23, 1879.

47. Ziem introduces his paper, by describing the disturbances of respiration due to stenosis of the nose, and draws special attention to the well-known observations of Kussmaul on children. The difference between breathing through the mouth and breathing through the nose is next discussed, and previous observations of asthma from swelling in the nose are cited. Ziem believes that asthma ensuing from swellings in the nose is neither to be regarded as a reflex-neurosis, nor does it rest upon a desiccation of the mucous membrane of the air passages; therefore he tries to give a mechanical explanation for its origin, according to which the asthmatic paroxysm is due to the fact that the contractions of

the muscles of the tongue and palate necessary in breathing through the mouth cannot occur satisfactorily from weariness. Then he gives a detailed description of the various morbid processes which lead to partial or total closure of the nose.

Finally, two cases from Voltolini's practice are communicated. The first refers to a closure of the right nostril by a dome-shaped prominence of the cartilaginous septum, due to repeated traumatic influences in childhood. The most prominent portion was treated with galvano-cautery in short sittings for several weeks, and the air passage thus restored. In the second case complete closure of the nose followed long continued colds and pain across the bridge of the nose, with subsequent pain above the mouth, and very great deafness. The skin of the nose was greatly swollen. The speculum revealed a homogeneous, compact swelling in the left nostril, leaving a small fissure, and the mucous membrane was covered with granulations. The velum palati was drawn upward, and attached in the region of the choanæ. The passage through the nose was restored by galvano-caustic destruction of the swelling. The union between the palate and the wall of the pharynx was likewise removed with the cauterizer, and catheterism, before impossible, was now rendered easy, and the hearing was restored.

48. Voltolini gives in the second edition of his treatise a description of his method of examination, based upon his extensive experience. We cannot here review the whole book, but must confine ourselves to recommending its study to everyone who is interested in the province of which it treats.

In the second section, Voltolini describes a method which he has just discovered, by which the hindrance which hitherto opposed the general use of rhinoscopy can be removed. According to him, the failure to draw the uvula forward with the various instruments devised for this purpose, is due to the use of too weak a traction. He convinced himself "that the uvula endures more easily a forcible, firm traction with a massive heavy spatula which reaches to the tonsils, than a gentle irritation and a traction which only embraces the uvula itself." Even children bear nicely the application of the palate hook. Part three, describes especially the advantage of direct sunlight for illumination. For anterior rhinoscopy, Voltolini resorts in addition to the usual instruments, to a speculum with a magnifying lens, like Brunton's ear speculum. Section 1, on the inspection of the pharynx with and without a mirror, is especially worthy of attention.

49. Jacobson reports two cases of youthful age, in which a firm, but easily bleeding polypoid mass was found on the cartilaginous part of the nasal septum. Neither the forceps nor the snare could remove it, and a narrow-bladed knife had to be employed. In both cases the growth consisted of firm, adenoid tissue, and mucous glands.

50. Catti begins his paper with an account of previous methods for operating on adenoid growths, and points out the disadvantages of galvano-cautery, of Meyer's ring-knife, Störk's steel snare-guillotine, and finally the insufficiency of caustics. The objections to Justi's sharp spoon are that its use is sometimes followed by violent inflammation of the ear. As regards the use of cold snares, Catti is of the opinion that every one can soon convince himself of its tediousness and lack of success in its operation. The reviewer, on the contrary, has convinced himself by experience, that the cold snare leads to its aim most safely, most quickly and most agreeably to the patient, when the operation can be performed under control of the mirror. As the snare can be made moderately large, the growths can be removed in a few sittings. If the operation does not succeed under control of the mirror, the reviewer also resorts to the newer operative methods, all of which are excessively disagreeable to the patient.

Catti recommends for the operation the curved forceps, (the horizontal and ascending portion forming an angle of 100°), to be introduced through the mouth. The portions seized are then crushed and pulled out. Löwenberg and Kessel described the use of such forceps some time previously.

51. Baginsky gives a detailed and very comprehensive description of the well-known methods of examining the nose and naso-pharyngeal space. The examination with Zaufal's specula is especially described, their introduction causing pain by no means slight, and a hemorrhage that is very troublesome. In many cases they cannot even be introduced. In spite of these disadvantages, Baginsky believes that this examination in the cases where it is feasible, might supplement posterior rhinoscopy. All the operative methods are described equally minutely, the galvano-caustic destruction of hypertrophy of the mucous membrane, the removal of nasal polypi with the snare, and the various methods of treating adenoid growths.

52. The adenotome of Delstanche, is also an instrument to remove adenoid growths through the mouth. Two cutting termi-

nal branches of a forceps fixed to a firm handle, can be shut by a ring, which can be pushed to and fro over them. The ring can be pushed along in spite of the curvature of the shaft, being set in motion by a spiral, which surrounds the shaft and is united with a lever resting on the handle. By bending the instrument, the forceps and its processes can be set in all possible directions.

53. Tillot reports in detail the historical views on ozæna and its treatment, and agrees with the now universally accepted experience, that ozæna does not depend on the presence of growths, but on the collection and decomposition of secretion. He was dissatisfied with the use of the usual nasal douche, and recommends an atomizing apparatus on Sales-Giron's principle. Five cases of the successful use of this instrument are then described.

54 Mosler's paper contains a note on the treatment of nasal and naso-pharyngeal catarrh. He saw very good results from sea-air and sea-water, and so directs gargles every morning and evening for months, of 1-4 tablespoonfuls of 20 per cent.-30 per cent. solutions of sea-salt. The teeth should be cleansed afterwards to protect them from injury. The gargling should be combined with contractions of the muscles of the throat, (deglutition motions), so that a part of the gargle is driven through the nostrils.

55 and 56. Zaufal reports in his preliminary paper and its supplement, his observations on the plica-salpingopharyngea, which he calls the ridge-fold. This projects forward, especially in throttling movements, like a sharply defined medial fold, which varied in thickness. It stretches 3-5 *cm.* along in direct continuation of the tubal convolution, downward and backward. When the head is bent backward, this fold can be inspected by drawing forward the uvula with a hook. It is also visible during the rhinoscopic examination, as well as by palpation with the finger. It is pushed forward by the action of the upper constrictor of the pharynx.

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